

AMERICAN JOURNAL OF OPHTHALMOLOGY

THIRD SERIES FOUNDED BY EDWARD JACKSON

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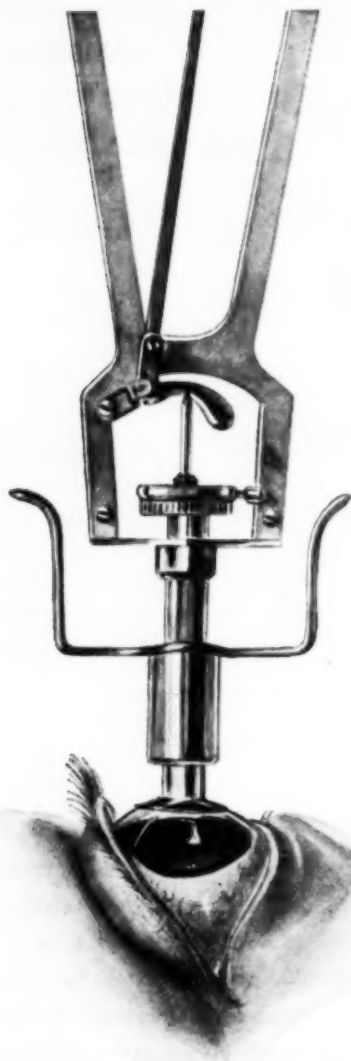
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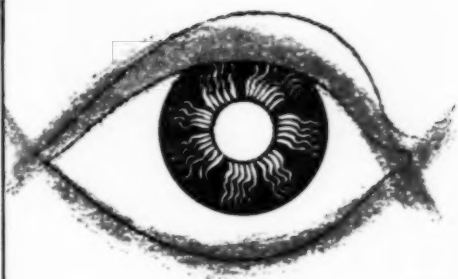


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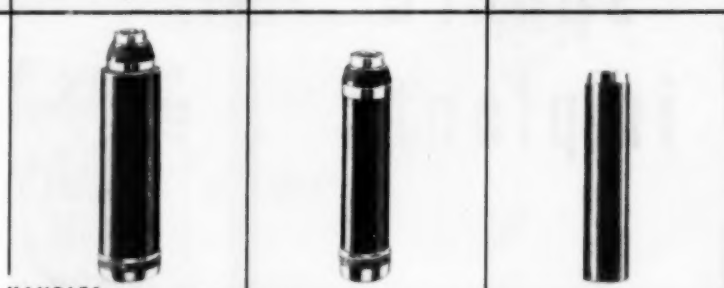
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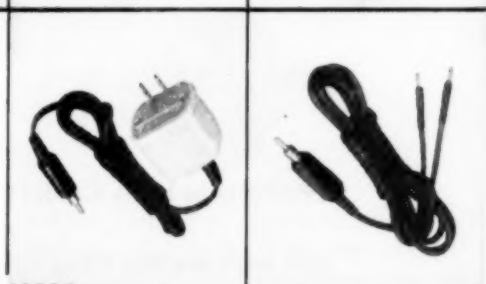
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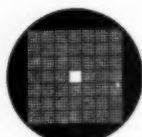
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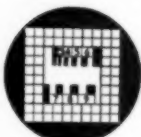
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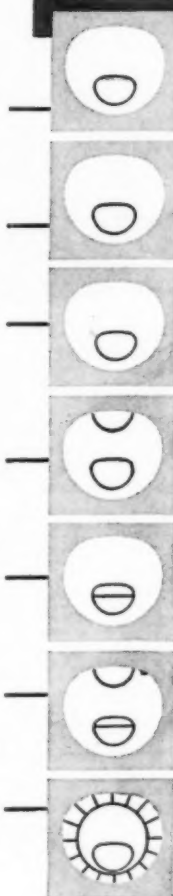
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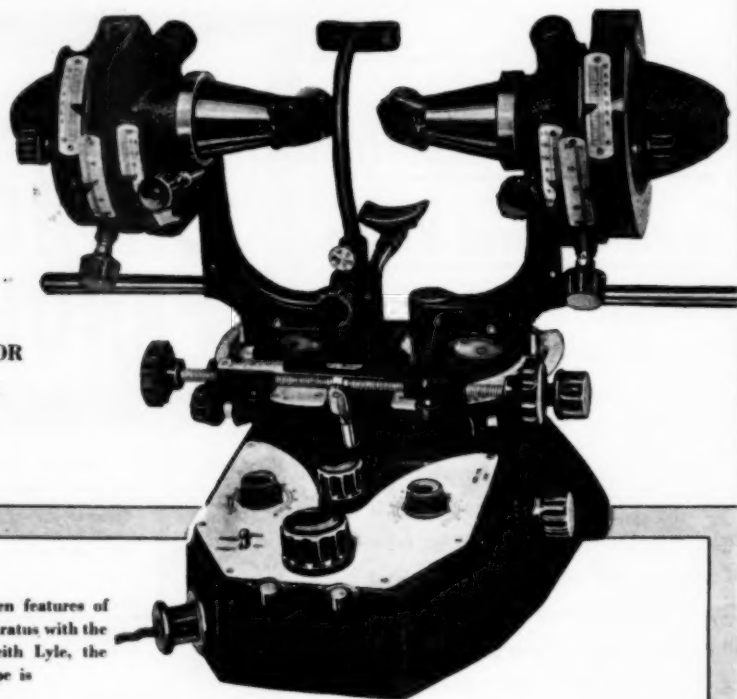
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In this formula "T" is the difference in thickness between the base and the apex. "P" is the prism and "D" is the diameter of the lens. The table below was computed from this formula and shows the thickness difference between the base and the apex of knife edge prisms. The table is figured for optical crown glass of index 1.523. For flint glass of index 1.690 multiply the figures given in the table by 0.758.

Prism	DIAMETER OF LENS					
	38	40	42	44	46	48
.5	.36	.38	.40	.42	.44	.46
1.0	.72	.76	.80	.84	.88	.92
1.5	1.09	1.15	1.20	1.25	1.32	1.38
2.0	1.45	1.53	1.61	1.68	1.76	1.84
2.5	1.82	1.91	2.01	2.10	2.20	2.30
3.0	2.18	2.29	2.41	2.50	2.64	2.76
3.5	2.54	2.67	2.81	2.92	3.08	3.22
4.0	2.90	3.05	3.20	3.36	3.52	3.68
4.5	3.26	3.43	3.60	3.78	3.96	4.14
5.0	3.62	3.81	4.00	4.20	4.40	4.60
6.0	4.34	4.56	4.79	5.00	5.28	5.42
7.0	5.05	5.32	5.58	5.84	6.16	6.44
8.0	5.76	6.10	6.37	6.72	7.04	7.36
9.0	6.46	6.80	7.14	7.56	7.92	8.28
10.0	7.17	7.54	7.92	8.40	8.78	9.17

"IF IT'S A LENS PROBLEM, LET'S LOOK AT IT TOGETHER"

AMERICAN JOURNAL OF OPHTHALMOLOGY

SERIES 3 · VOLUME 36 · NUMBER 4 · APRIL, 1953

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ABSTRACTS

Anatomy, embryology, and comparative ophthalmology; General pathology, bacteriology, immunology; Vegetative physiology, biochemistry, pharmacology, toxicology; Physiologic optics, refraction, color vision; Diagnosis and therapy; Ocular motility; Conjunctiva, cornea, sclera; Uvea, sympathetic disease, aqueous; Glaucoma and ocular tension; Crystal-line lens; Retina and vitreous	550
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A TYPE OF CONGENITAL OCULAR MOTOR APRAXIA PRESENTING
JERKY HEAD MOVEMENTS*

THE JACKSON MEMORIAL LECTURE

DAVID G. COGAN, M.D.

Boston, Massachusetts

The title of this paper has been selected to describe a clinical entity in which there appears to be an inability to turn the eyes voluntarily in a direction for which there is full involuntary or quasivoluntary control and in which a compensatory head movement is so characteristic as to be diagnostic of the entity. So far as I have been able to ascertain this particular entity (congenital ocular motor apraxia) has not previously been described.

The term ocular motor apraxia is used to emphasize the absence of willed movements[†] but retention of those movements not directly related to the will; it has previously been used in certain cases of acquired loss of willed movements of the eyes.^{2, 6-7, 9} Apraxia has been defined in neurologic vernacular as "the inability to move a certain part of the body in accordance with a proposed purpose, the motility of this part being otherwise preserved."⁴ In the type of disturbance to be described in this paper the patient is apparently unable to direct his gaze to one or the other side when his attention is

suddenly attracted to that side, although he is able to look freely from side to side when no such stimulus is applied. It is also noteworthy that rotation of the head about the vertical axis results in a maintained contraversive deviation of the eyes which the patient is unable to inhibit.

The compensatory head movements in congenital ocular motor apraxia are often the presenting abnormality and may mask the ocular basis for the disturbance. Being unable to turn the eyes quickly to one side the patient turns his head but in so doing the vestibular reflex causes the eyes to deviate with respect to the head even further to the side opposite the object of attention. Thus to fixate on the object it is necessary to turn the head considerably farther producing the characteristic overshoot. Once the eyes are brought by this means to fixate on the object of attention, the head returns to the position directed toward the object. This whole cycle of jerky or spasmodic head movements on fixation occurs in something less than a second.

This abnormality of eye and head movements has been compared with the normal by means of slow-motion moving pictures which may be summarized with the aid of the accompanying diagram (fig. 1).

When a person with normal control of eye movements is asked to look at an object to one side, he first turns his eyes (usually associated with a blink of the lids) and then his head, but the direction of eye movement

* From the Howe Laboratory of Ophthalmology, Harvard University Medical School, and the Massachusetts Eye and Ear Infirmary. Presented at the 57th annual session of the American Academy of Ophthalmology and Otolaryngology, Chicago, October, 1952.

† By willed movements is meant those movements in which a person turns his eye in response to a command or to look at an object that suddenly attracts his attention, or to move his eyes in response to a conscious effort without any apparent external stimuli.

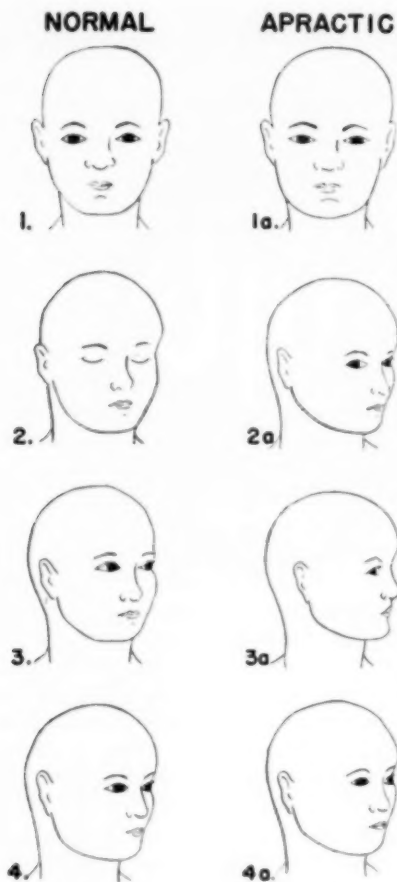


Fig. 1 (Cogan). Comparison of head-eye movements of a normal person with those of a patient having congenital motor apraxia. The diagrams represent the series of events on looking from the primary position to the left. (The blink of the lids is usually, but not always, present in the normal person and usually, but not always, absent in the apraxic patient.)

is always adversive and the head-turning always lags behind that of the eyes (fig. 2).

If gaze is maintained on an eccentric object the head may eventually be turned fully toward the object but never overshoots the mark.

In contrast to this, when a person with the type of ocular abnormality under discussion is asked to look at an object to one

side, he first turns his head and this results in a movement of the eyes in a contraversive direction with consequent overshooting of the mark by the head.

This abnormality has involved lateral movements only and has not been characteristically associated with other ocular or neurologic abnormality. It is apparently of congenital origin but its pathogenesis is obscure.

The present report is based on the study of four cases seen by me over an 11-year period. Of these, two were referred to me by a neurologist (Dr. Bronson Crothers) and two by ophthalmologists (Dr. Carl Johnson and Dr. Daniel Reagan). This is cited to show that the patients are not necessarily seen first by an ophthalmologist.

CASE REPORTS

CASE 1

A. J. S., a boy, was brought to the hospital first at the age of one year because of jerky head movements with simultaneous contraversive deviation of the eyes since birth. The baby was the first and only child. There was no known ocular abnormality in the parents or relatives.

Delivery was characterized by a prolonged labor, lasting four days, during which time the fetal heart sounds became weak and rapid. The baby was examined by a neurologist one half hour after birth who reported: "definite signs of intracranial damage. The eyes were kept wide open and deviated in a conjugate manner from side to side and at times, upward. At the extreme right or left, nystagmoid movements could be appreciated but the greatest part of the movement was rather slow and quite different to true nystagmus."

Except for some hyperactivity of the patellar reflexes, the rest of the neurologic examination revealed nothing abnormal. Ten hours after birth and again on the fifth and sixth days the infant had a generalized convulsion.

The patient developed well and, except for the eyes and head movements to be described, appeared normal. It is noteworthy, however, that, during the first few months of life, persons about him thought he was blind because he did not follow objects with his eyes.

The ocular findings at the age of six months could be analyzed from a home moving picture taken of the baby at that time. They were characterized by a full and free movement of the eyes as the baby looked around in a haphazard fashion. But if his attention were suddenly attracted by an object on the side toward which he was not looking, the eyes appeared to be "frozen" in their previous



Fig. 2 (Cogan). Photographs of normal head-eye movements on looking from left to right. The child happened to be looking toward the left (a) when she was asked to fixate an object on her right. The lids closed momentarily as the head began to turn to the right (b). When the lids opened, the eyes were seen to be fully turned to the right (c). The turning of the head had lagged behind that of the eyes. Finally, both head and eyes were turned to the right for final fixation (d).

position and he could fixate the object only by turning his head.

This he did very rapidly and while he did so the eyes either remained fixed in the eccentric gaze to the opposite side or turned farther to that side, that is still farther from the object, during the turning (fig. 3). Thus to fixate the object it was necessary to turn the head past the object of attention. Once the object was fixated, however, the head returned to an almost primary position while the eyes continued to be directed toward the object. The whole cycle of events occurred in approximately one second.

At the age of one year the ocular phenomena were essentially the same, although the parents volunteered that it was less conspicuous than formerly (fig. 4). At this time, however, it could be ascertained that rotation of the head similarly resulted in an eccentric fixation of gaze. Instead of developing a coarse nystagmus on rotation, as does the normal infant, the patient's eyes deviated to the

side opposite the rotation and remained there during and for one or two seconds after the rotation.

The abnormality in this case was apparently an absence of the rapid phase of that nystagmus which occurs in the normal one-year-old infant on rotation. The rest of the neurologic and psychometric examination indicated an otherwise normal infant. The ability to fixate on small objects indicated a good visual acuity.

The patient was again examined at the age of nine and one-half years. The chief complaint in the meantime had been in reading. He volunteered that he was unable to scan a line, in fact could not read more than one word at a time. His mother also observed that he stumbled more than most children and especially when he was with strangers.

The patient further stated that he had difficulty in making sharp turns, specially in quarters with which he was unfamiliar, and was thereby incapacitated for horseback riding. No change in the eye status had been observed by the patient or parents even



Fig. 3 (Cogan). CASE 1. These photographs were taken when the patient was aged six months. He was gazing to the right when a toy fish was brought in from the left attracting his attention. Being unable to turn his eyes to the left, the baby turned his head, and in so doing, developed a further dextroversion of his eyes (in respect to his head).



Fig. 4 (Cogan). CASE 1. These photographs were taken when the child was aged one year. The patient was looking at a pocketbook to his right (a) when the noise of the moving picture camera in front of him attracted his attention. In order to fixate straight ahead, he thrust his head to the left (b) with extreme dextroversion of his eyes. Fixation with the eyes necessitated overshoot of the head (c). Once that fixation was attained, the head turned back to approximately the primary position (d). The same sequence of events occurred on looking to the right. Thus, the patient happened to be gazing to the left (e) when the noise of the camera attracted his attention. He looked to the right by overshoot of the head to the right (f) and relative levoversion of the eyes until fixation was attained. Then the head returned approximately to the primary position (g).



Fig. 5 (Cogan). CASE 1. The final photograph of the patient in Figures 3 and 4 was taken when he was aged nine and one-half years. The eyes showed extreme levoversion on rotation of the body to the right. Similarly, an extreme dextroversion of the eyes occurred on rotation of the body to the left.

though he had been given extensive exercises on "learning to control the eyes" by looking in a mirror while rotating the body.

Of particular interest was the parents' observation that the patient appeared to develop a spasm of gaze when commanded to look in one or the other direction and that this was also more apparent in the presence of strangers. As a consequence the family had purposely avoided the command "look."

Neurologic examination at the age of nine and one-half years showed no abnormality other than that associated with the eyes. Mental development was said to be normal for his age.

The abnormalities in the eyes were essentially the same as those previously noted, consisting of a defect in voluntary horizontal gaze and in the presence of a compulsory labyrinthogenic deviation of the eyes (fig. 5). When the examiner faced the patient and snapped his fingers to either side the patient was unable to make quick movements of regard without turning his head. Indeed, he often appeared to move the eyes in the wrong direction. He was unable to follow a finger moved slowly to either side.

Yet, when the patient was not commanded to look in any direction the eyes moved freely and fully.

If the patient's head was not restrained actively or passively and he was commanded to look to one side or the other, he would show the same overshooting of the head with contraversive deviation of his eyes as he had shown in infancy.

With the optokinetic drum there was only an abortive response consisting of a single deviation of the eyes in the direction of rotation of the drum; there was thus an absence of the fast phase of the optokinetic cycle. Vertical movements on command and on following a moved object were entirely normal and the optokinetic response in the vertical direction was prompt and well sustained.

There was no spontaneous nystagmus. The pupils were of normal size and reaction. The fundi were normal.

CASE 2

M. S., a boy, was first seen at the Eye Clinic of the Massachusetts Eye and Ear Infirmary at the age of 11 months because of "muscle trouble" of the eyes. Since the age of three months the patient had been noted to turn his head instead of his eyes when fixating an object to one side.

The patient had been delivered by forceps but no other unusual event had occurred at birth or subsequently. Aside from the eye and head movements, the patient was considered normal. The mother did think that learning to walk was unusually delayed and that the patient was unduly awkward. There was, however, no evident neurologic abnormality.

Examination of the eyes showed an inability to

look to either side when the patient's attention was suddenly alerted but full random movements when "at ease."

To fixate on an object to either side the patient made a quick turn of the head past the object of regard. This was accompanied by a deviation of the eyes to the side opposite the direction of head movement until fixation was attained. The entire cycle occurred in a fraction of a second and gave the effect of a curious throwing of the head to either side. It was approximately symmetrical.

The optokinetic test elicited a slow phase but no rapid phase in the horizontal direction. On rotation of the patient about the vertical axis, the eyes regularly assumed a conjugate and extreme deviation in the direction opposite to that of rotation.

Movements of the eyes in the vertical direction appeared to be normal and the optokinetic response in the vertical direction was normal.

The patient was again examined briefly at the age of two and one-half years. The characteristic thrust of the head to either side on eccentric fixation persisted. Rotation of the body also resulted in uncontrollable deviation of the eyes to the side opposite the direction of rotation. The optokinetic response was definitely abnormal to either side but abortive cycles were obtained on rotation of the drum to the patient's left. The patient appeared to be able to follow a slowly moving finger fairly accurately although his age made accurate testing unreliable.

The patient was not subsequently examined but correspondence with his physician indicated that at the age of seven years there was still compulsory

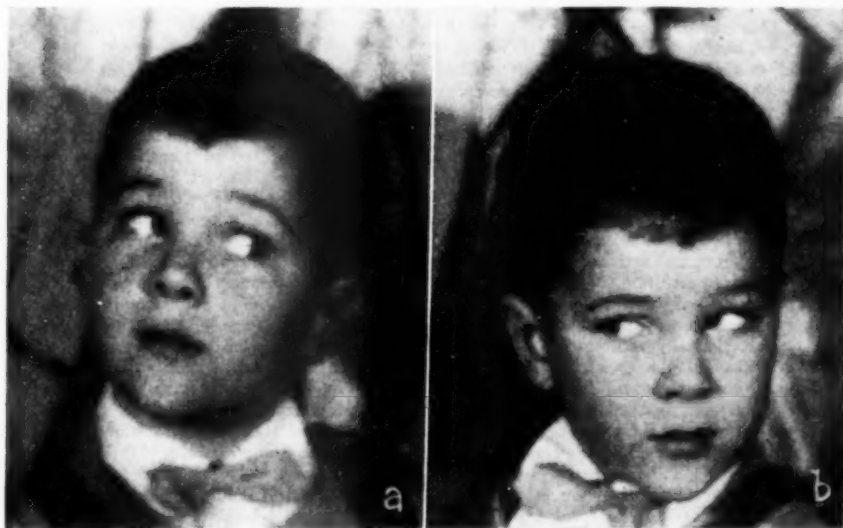


Fig. 6 (Cogan). CASE 3. These photographs were taken when the patient was aged three and one-half years. The picture on the left shows levoversion of the eyes on rotation of the body to the right; the one on the right, shows dextroversion of the eyes on rotation of the body to the left.



Fig. 7 (Cogan). CASE 3. These photographs were taken when the boy was aged six years. The patient was gazing to the right (a) when he was asked to look at the camera. A turn of the head was accompanied by closure of the lids, as in the normal person, but when the lids opened, the eyes were seen to be in a position of extreme dextroversion (b). As a result, the patient had to overshoot the mark with his head to attain fixation straight ahead (c). Once the eyes fixated, the head returned approximately to the primary position (d).

deviation of the eyes on rotation and some overshoot of the eyes on eccentric fixation.

CASE 3

P. I., physician's son who was first examined at the age of three and one-half years. There had been no unusual events during gestation or delivery and the patient had appeared normal during the first few months of life except for a web toe between the second and third digits.

An abnormality of the eyes was first suspected at three months of age when the patient did not respond as a normal infant would to objects brought into his field of vision. Accordingly he was thought to be blind. However, at the age of five to six months he began to fixate on objects by the jerk of his head. This continued to the time of the first examination without substantial change. The abnormal head movements were said to be more conspicuous when the patient was fatigued. Except for this abnormality of head and eye movements the child had developed normally.

On examination the eyes were usually held in the primary position and so long as the patient was not being alerted to look to either side he had full random movements. But when he was asked to fixate an object on either side without moving his head he usually "froze up" and was unable to turn the eyes in the desired direction.

Left to his own devices, he would fixate an object by thrusting his head toward the object of attention. This was characteristically accompanied by a contraversive deviation of the eyes necessitating an overshoot of the head movement for fixation.

The optokinetic response could not be elicited with horizontal rotation of the visual field. Rotation of the body to either side resulted in a contraversive deviation of the eyes (fig. 6).

The vertical movements of the eyes appeared to be promptly and normally performed and there was a well-sustained vertical optokinetic response.

The patient was again examined at five and six years of age. He had developed normally except for the eyes and was able to ride a tricycle and partici-

pate actively in the usual athletic activities of childhood. The essential abnormality of absence of willed movements remained unchanged, although the full random movements were present.

The patient continued to show the characteristic head movement on looking to either side (fig. 7) and the mother observed that this was most striking when he was fatigued or excited.

Rotation of the body resulted in a contraversive and maintained deviation of the eyes which the patient was unable to inhibit. The optokinetic test showed a slow phase but an absence of the fast phase of the cycle. Following movements of the eyes were jerky and poorly executed. The vertical movements were normal for command, following, and optokinetic tests.

CASE 4

E. O., a two-year-old male infant, was admitted to the hospital for spasticity of gait and anomalous eye movements thought to date from birth.

The patient's mother had had carbon monoxide poisoning in the second month of pregnancy and was comatose for 12 hours. She recovered, however, without manifest sequelae. Pregnancy and delivery had been otherwise uneventful. Two siblings, both older than the patient, were normal.

Until the baby began to walk, development was thought to be normal. He sat alone at eight months of age and stood alone at 18 months. At 23 months he began to take steps but it was noted that he had an extremely awkward gait, characterized by stiffness of the legs and instability of posture.

Neurologic examination at two years of age showed a marked rigidity of all extremities, but greater on the right, that was thought to indicate an extrapyramidal syndrome. However, there was no clonus or extensor plantar reflex.

Examination at the age of three years and again at three and one-half years of age is said to have shown a mild right hemiplegia and tight heel cords characteristic of a patient with cerebral palsy. He was thought to be mentally normal for his age.

Examination of the eyes at two years of age



Fig. 8 (Cogan). CASE 4. These photographs were taken when the patient was aged three and one-half years. The child happened to be gazing to the right and down (a) when he was alerted by an object directly in front of him. He responded by turning his head to the left (b) and overshooting the mark. After attaining fixation, the head returned approximately to the primary position (c). Conversely, when the patient happened to be gazing to the left (d) and his attention was directed to an object straight ahead, he responded by turning his head to the right (e) with consequent levoversion of the eyes. The head then overshot the mark (f) but after fixation returned to the primary position (g).

revealed an inability to turn the eyes when attention was suddenly alerted to an object in the eccentric field but preservation of full random movements. To fixate an object the patient thrust his head to one side (fig. 8).

This was accompanied by an involuntary contraversive deviation of the eyes with consequent overshoot of the head on fixation. Similarly with rotation of the body about a vertical axis an involuntary deviation of the eyes regularly occurred in the direction opposite to that of rotation of the body.

The inability to look to either side was present bilaterally but the head thrust appeared to be more striking in fixating objects on the left than on the right.

The optokinetic test elicited a slow deviation of the eyes in the direction of rotation of the drum but no nystagmus. Following movements appeared to be normal although coöperation was necessarily limited in a two-year-old infant.

Vertical movements appeared normal for both following and command movements. In contrast to the compulsory deviation of the eyes without nystagmus in the horizontal meridian, a well-sustained vertical and rotary nystagmus without maintained deviation of the eyes was produced by rotation of the head about appropriate axes.

The patient was reëxamined at two and one-half and three and one-half years of age. He continued

to have considerable ataxia in walking, had frequent falls, and was unable to cope with a tricycle. The eyes showed the same inability to look voluntarily to either side, with consequent head thrusts. Rotation of the body resulted in contraversive deviation of the eyes which could not be inhibited. Visual acuity was normal and the rest of the ocular examination did not reveal any abnormality.

DISCUSSION

The presented cases of ocular motor apraxia must be distinguished from other disturbances listed under the broad category of pseudo-ophthalmoplegia. They must especially be distinguished from those conditions in which voluntary control of eye movements is lost but in which vestibulogenic deviation of the eyes is retained (the so-called Roth-Bielschowsky syndrome).^{1, 2}

In this syndrome the vertical movements are preferentially or exclusively affected and there are usually other neurologic signs and symptoms collectively termed pseudobulbar palsy. Indeed it was the analogy with the

clinical entity of pseudobulbar palsy that led to the designation of the eye signs as pseudo-ophthalmoplegia.⁸ A particularly graphic illustration is to be found in the case report of Ford and Walsh.⁹

In common with this type of pseudo-ophthalmoplegia, the present patients with ocular motor apraxia had paralysis of voluntary movements and showed reflex deviation of the eyes with labyrinthine stimulation. But they differ from pseudo-ophthalmoplegia in the preservation of random movements (indeed the harder the patient with apraxia tries, the less well can he execute the desired act; this is just the reverse of the case with pseudo-ophthalmoplegia) and in the preferential involvement of lateral movements.

The few cases of acquired ocular motor apraxia that have been described and the congenital cases herein described have in common the essential abnormality of loss of willed movements of the eyes with retention of random movements but the curious jerky head movements which are so characteristic of the congenital type were absent in the acquired form.

This absence of compensatory head movements in the acquired form was due, in at least one case seen by me, to the fact that there was apraxia of the head movements as well as of the eye movements so that compensatory head movements could not be executed. The congenital variety, on the other hand, was a selective involvement of the ocular motor mechanism with retention of full control of the head movements.

A further difference may be present in that the compulsory vestibulogenic deviation of the eyes which is present with the congenital type may not be present with the acquired type. However, data on the vestibular activity of the acquired variety is too meager to be conclusive.

It is curious that congenital ocular motor apraxia has not been described in adults and that I should have seen it in four in-

fants and not once in an adult. The possible explanation that it clears up in later life seems unlikely in so far as there has not been any major change in the one patient who has been followed longest, that is from six months to nine and one-half years of age.

All the patients in the present group were boys but whether or not this is of significance must await a larger series. No evidence was obtained that it is familial and only in one patient was it accompanied by other neurologic deficits.

Whether the condition represents the development of an abnormal neurologic state or is the abnormal persistence of a normal developmental stage is a perennial question in all congenital defects. However, it does seem that an apraxia of the eye movements is a normal condition for infants during the first few weeks of life.

When newborn infants are alerted by an object to one side, they show little ability to fixate the object; yet the retraction of their lids is sufficient evidence of their state of alertness and they have full random movements of their eyes. It is, moreover, well known that they show also the maintained deviation of the eyes on rotation of the head.

Congenital ocular motor apraxia can scarcely be said to be incapacitating. Patients with it apparently learn to walk with only slightly more difficulty than normal and usually participate in the usual athletic activities of childhood with little difficulty. The curious thrusts of the head are, however, alarming to the parents and disconcerting to the physician unless he understands the basis for them. It is noteworthy that two of the present patients were first thought to be blind because of their failure to fixate on objects. The only patient in the present series to have reached sufficient maturity to make worth-while introspective observations stated his only real handicap was in reading and in making quick turns.

A reasonable direction of therapy might

be aimed at depression or abolition of the labyrinthine function but the symptoms so far have not warranted the hazards involved.

SUMMARY AND CONCLUSIONS

1. A clinical syndrome is described in which there is an absence of willed movements of the eyes to either side, although full random movements are retained, and in which fixation of gaze is accomplished by a jerky overshooting of the head. Rotation of the head about the vertical axis results in an involuntary and maintained deviation of the eyes in the direction opposite to that of rotation. It is this contraversive deviation of the eyes which the patient is unable to inhibit that conditions the characteristic overshooting of the head on fixation of an eccentric point. The abnormality is one of horizontal movements only and involves movements resulting from command, following, and opticokinetic stimuli.

2. The syndrome is represented in the present report by four patients. It was presumably congenital in all. In two patients there was nothing else in the history or examination to suggest other neurologic disease; in one patient there were convulsions

shortly after birth but no neurologic sequelae; in the fourth patient there was a history of carbon monoxide asphyxia in the mother during the second month of gestation and the child had a persistent extrapyramidal disease. No other members of the family had similar or related disease in any of the cases.

3. The syndrome must be differentiated from (a) simple palsies of conjugate gaze in which random movements are lost to as great or greater extent than are the willed movements and from (b) other forms of congenital pseudo-ophthalmoplegia in which vertical movements are predominantly affected and in which there are other neurologic symptoms.

4. Although the entity of acquired apraxia has been previously described, this appears to be the first description of the congenital variety. Unlike acquired ocular motor apraxia, in which head and eye movements are both involved, the congenital variety involves eye movements exclusively, and fixation on an eccentric point is accomplished by characteristic head jerks.

243 Charles Street (14).

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EVALUATION OF THE URETHANE OF BETA-METHYLCHOLINE CHLORIDE IN CHRONIC GLAUCOMA*

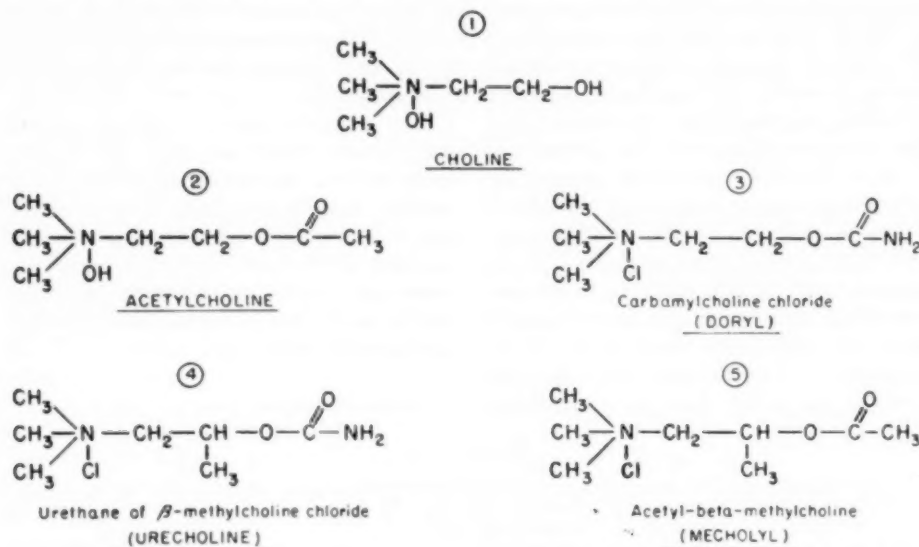
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Urecholine is one of a group of choline esters that act principally by producing the effects of stimulation of the parasympathetic nervous system.

Chemically, urecholine is the urethane of beta-methylcholine chloride. Its structural formula and that of carbaminoylcholine chloride can be seen in Figure 1. The struc-

This compound is possibly the longest acting miotic and the most potent of this choline series. Even in dilute solutions, it can be autoclaved at 120°C. for 20 minutes without any discoloration or loss of potency.

Its use in ophthalmology has been limited and one finds it mentioned rarely in ophthalmic literature. Swan¹ has mentioned



Patient AGE	Type of Chronic Glaucoma	Eye	Field Change	V.A.	Surgery	Previous Miotic PILOCARPINE PER CENT	Instillations daily	Tension Range	URE- CHOLINE 1% + †	Instillations daily	Tension Range	Remarks:
A.D. - 51	Narrow angle	O.D. O.S.	No	6/6 6/9	NO IRIDECTOMY 1944	1/2 1/2	4 3	13—30 13—23	† †	4 3	12—23 13—23	NO PROGRESSION
C.F. - 60	"	O.D.	Early	6/9	NO	1	3	17—23	†	3	16—23	"
A.R. - 42	"	O.D.	Early	6/6	NO	1	3	18—25	†	3	18—23	"
J.N. - 77	Wide angle	O.D. O.S.	Advanced	6/12 6/15	NO	1	4	15—23 17—30	† †	4	15—20 17—20	NO CHANGE SLIGHT BENEFIT
J.B. - 69	"	O.D. O.S.	"	6/21 6/15	NO	1	4	23—30 23—36	† †	4	17—20 17—23	"
R.L. - 72	Wide angle Secondary to central venous occlusion	O.D. O.S.	Advanced No field	6/6 L.P.	NO NO	1 2	3 5	17—26 50—66	† †	4 5	26—31 50—66	LESS EFFECTIVE NO CHANGE
I.S. - 60	Wide angle	O.D. O.S.	Moderate	6/6 6/6	NO	2	4	26—40 26—35	† †	4	17—30 20—30	SLIGHTLY LOWER
W.A. - 70	"	O.D. O.S.	"	6/6 6/5	NO	1	3	15—23 15—26	† †	3	15—26 15—26	NO CHANGE
M.K. - 73	"	O.D.	"	6/12	NO	1	4	19—30	†	4	23—26	"
U.M. - 68	"	O.D.	"	6/6	NO	2	3	16—36	†	4	16—36	"
T.M. - 49	"	O.D. O.S.	"	6/6 6/6	NO	2	4	17—23 18—24	† †	4	16—21 13—23	" SLIGHT LOCAL IRRITATION-GL.
J.O. - 68	"	O.D. O.S.	"	6/6 6/9	NO	2	4	17—36 16—20	† †	4	17—26 17—23	NO CHANGE SLIGHT LOC. IRRIT. GL. B ON PREV. MIOTIC
J.A. - 37	"	O.D. O.S.	Moderate Advanced	6/15 H.M.	NO	2 4	4 4	17—31 28—58	† †	4	15—19 28—36	SLIGHT IMPROVMENT
P.K. - 43	"	O.D. O.S.	Early	6/6 6/5	NO	1	3	15—23 15—23	† †	3	15—23 15—23	NO CHANGE
M.N. - 72	"	O.D. O.S.	Advanced	6/6 6/9	NO	2	4	18—30 16—31	† †	4	16—28 15—31	"
V.K. - 68	"	O.D. O.S.	"	6/15 6/15	NO	2	4	16—33 19—26	† †	4	19—30 19—30	"

Chart 1 (Frisch and Leopold). Clinical use of urecholine as compared to pilocarpine.

Patient AGE	Type of Chronic Glaucoma	Eye	Field Change	V.A.	Surgery	Previous Miotic	Instillations daily	Tension Range	Ure-choline †	Instillations daily	Tension Range	Remarks
C.F. - 60	Secondary to central venous occlusion	O.S.	Advanced	L.P.	IRIDECTOMY	PILO-ESERINE 4% 1%	5	56—76	†	4	60—66	NO BENEFIT
W.R. - 45	Wide angle	O.D.	"	6/5	ELLIOTT, 1945 IRIDEN-CLEISIS 1946	PILO-ESERINE 4% 1/2%	4	19—25	†	4	15—26	NO PROGRESSION
	Wide angle	O.S.	"	6/15	ELLIOTT, 1945 IRIDEN-CLEISIS 1946	PILO-ESERINE 4% 1/2%	4	36—49	†	4	36—51	NO BENEFIT
J.K. - 77	"	O.D.	"	6/12	NO	PILO-ESERINE 4% 1/2%	4	26—40	†	4	20—36	NO CHANGE
G.K. - 73	"	O.S.	Moderate	6/9	NO	PILO-ESERINE 4% 1%	5	26—40	†	4	30—40	"
U.M. - 68	Absolute	O.S.	—	L.P.	NO	PILO-ESERINE 4% 1/2%	4	50—66	†	5	50—60	"

Chart 2 (Frisch and Leopold). Results of use of urecholine in eyes which had also been treated with combinations of pilocarpine and eserine.

Patient- AGE	Type of Chronic Glaucoma	Eye	Field Change	V. A.	Sur- gery	Previous Miotic	Instilla- tions daily	Tension Range	Ure- choline	Instilla- tions daily	Tension Range	Remarks
A.G. - 73	Wide angle O.U. ALL	O.D. Advanced O.S. ———	6/9 6/30	NO		DORYL 0.75% O.U.	3 O.U.	15—28 19—28	0.U.	3 O.U.	15—28 19—30	NO CHANGE
B.H. - 40	PATIENTS	O.D. ——— O.S. ———	6/12 6/15					18—25 16—25			15—28 15—25	
A.L. - 50		O.D. ——— O.S. ———	6/9 6/12					19—26 19—26			16—25 19—25	
T.R - 59		O.D. ——— O.S. ———	6/9 6/21					16—23 19—30			16—25 19—31	

Chart 3 (Frisch and Leopold). A comparison of urecholine and doryl.

with chronic glaucoma at the Wills Hospital.

Comparisons were made with other cholinergic agents, namely pilocarpine, nitrate and hydrochloride, and carbaminoylcholine chloride (doryl), as well as with physostigmine, an anticholinesterase.

Urecholine was tried also in several cases of glaucoma secondary to venous thrombosis and in several cases of absolute glaucoma. The concentration of the drug employed was one percent in zephiran (1:10,000). It was applied by the instillation method as were the other drugs with which it was compared.

Chart 1 shows the type of case in which pilocarpine in various concentrations and urecholine (one percent) were used. Surgery had been performed in only one of these cases. Urecholine was felt to be a satisfactory substitute in cases in which fields, visual acuity, and tension remained the same or improved during its administration. It will be noted that local irritation occurred in only two of the patients on urecholine, T. M. and J. O., and one of these, J. O., had described the same sensation on the pilocarpine (two percent) previously employed. One patient, J. B., developed a possibly allergic blepharoconjunctivitis after five months of urecholine therapy. Infection of the lid margins was also present at this time so this was not solely an allergic reaction.

Chart 2 shows the comparative results in eyes which had also been treated with combinations of pilocarpine and eserine. All but one of these six eyes had already shown advanced field loss before urecholine was em-

ployed. Ocular surgery had been performed in three of the six eyes. Although only one of the six is classified as controlled on urecholine (one percent), all six fared as well as they had on the previous combined miotics.

Chart 3 shows urecholine (one percent) to be as satisfactory as doryl (0.75 percent) in eight eyes.

All eyes treated with urecholine (one percent) were on the drug for at least three months and most for eight or nine months. The only exceptions were two cases in which urecholine was stopped in one month because of unsatisfactory control and lack of improvement.

Chart 4 compares the results with urecholine and other previously employed miotics in the same eyes.

No of Eyes	Drug	Number controlled	No. controlled by URECHOLINE %
2	PILOCARPINE ↓ 1/2 %	2	2
12	↓ 1 %	12	12
13	↓ 2 %	10	12
1	↓ 4 %	0	0
6	↓ 4 % + ESERINE 1/2 - 1 %	1	1
8	DORYL 0.75 %	8	8
42		33	35
TOTALS			

Chart 4 (Frisch and Leopold). Comparison of results with urecholine and other previously employed miotics.

CONCLUSIONS

From the results in this small series, the following conclusions may be made with regard to urecholine (one percent):

1. Urecholine in one-percent concentration approximates pilocarpine (one to two percent) and doryl (0.75 percent) in the therapy of chronic noncongestive glaucoma.

2. Urecholine (one percent) was not effective in glaucoma secondary to venous occlusion.

3. Urecholine has the following disadvantages:

a. Mild allergic reaction in one of 42 eyes.

b. There is the possibility of bronchoconstriction in asthmatics, but no instance of this occurred in this series.

c. Ciliary spasm may occur but it is not marked.

4. It appears to be an effective and safe miotic that may possibly be useful as a substitute for pilocarpine or doryl in chronic glaucoma.

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PRESENT STATUS OF GONIOTOMY*

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The objective of goniotomy is to restore the physiologic direction of outflow from the anterior chamber by removing the obstruction in the filtration angle. The obstruction appears to consist in most cases of residual mesodermal tissue associated with a false anterior insertion of the iris to the line of Schwalbe.

In the present article a simplified technique of goniotomy is presented and the results are evaluated.

INDICATIONS

Goniotomy is indicated in all bilateral and unilateral cases of congenital glaucoma in which increased pressure is the result of ob-

struction of the angle by persistent embryonic tissue or false anterior insertion of the iris, provided that Schlemm's canal has not been obliterated by prolonged distention of the globe. This includes the majority of cases of congenital glaucoma.

The earlier the goniotomy is performed after the onset of symptoms, the more effective it will be in maintaining or restoring vision. This stresses the importance of early diagnosis and operation.

Goniotomy may, however, be effective even after the lapse of several years provided the glaucoma has been noncongestive, the cornea has remained clear, the optic nerve has undergone little damage, the globe is not excessively enlarged, and good vision has been maintained.

Excellent results have been achieved in a

* Read at the 37th annual clinical congress of the American College of Surgeons, San Francisco, November, 1951.

number of cases in which these conditions were present in children aged four and six years, with corneal diameters of 14 mm.

CONTRAINDICATIONS

Goniotomy is usually contraindicated, however, in older children with enlarged eyes which have had a congestive history, show corneal scarring and cloudiness, and have a corneal diameter of 15 mm. or more.

In these "buphthalmic" eyes, the danger of hemorrhage is increased by the dilated vessels and newly established collateral circulation, absorption is slower by reason of the degenerative and circulatory changes, and Schlemm's canal may have been obliterated as a result of the distention.

Goniotomy may also be ineffective in those severe cases in which the cornea is porcelain white at birth. Such a degree of severity may indicate that the anomaly is associated with absence of Schlemm's canal.

It is suggested that goniotomy be selected in those cases in which it is indicated as the first operation and, if inadequate, be re-

peated before resorting to other surgical procedures. Of these operations cyclodiathermy appears at the present time to be the procedure of choice.¹⁻⁴

In the present series, a total of 178 eyes with congenital glaucoma were subjected to goniotomy between the years of 1936 and 1952.[†] The results of the operations on the first 76 eyes have already been reported.⁵⁻⁷

The purposes of the present article are threefold: (1) To evaluate the results of goniotomies performed on 86 eyes in the last three years by means of a more fully developed and simplified surgical technique; (2) to describe this technique; and (3) to evaluate goniotomy on the basis of the results obtained in the entire series of 178 eyes.

TECHNIQUE OF GONIOTOMY

As presently employed, the technique of goniotomy is relatively simple. In the early stages of developing the operation, several different ways of approaching the stripping of the angle were devised, as for example, by the use of a blunt instrument, by visualizing the angle with an injection of air and operating through the air-filled chamber, by a preliminary deepening of the chamber with saline solution^{8, 9} among others. As the early difficulties have been overcome, these various approaches have been discarded.

In all cases in which clarity of the cornea permits, goniotomy is performed with the contact glass. By means of the glass, the angle of the anterior chamber is made visible to the surgeon while he is operating so that he can direct the blade of the knife under gonioscopic control and remove the obstruction in the angle under direct (magnified) vision (fig. 1).

In many of the early cases of the series, cloudiness of the cornea prevented operating with the glass, but latterly the operation under gonioscopic control has been made

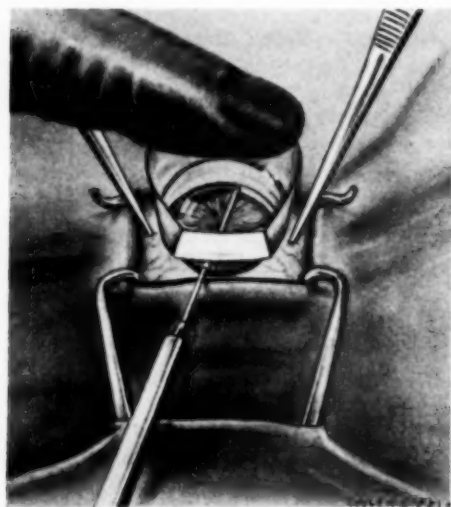


Fig. 1 (Otto Barkan). Drawing shows goniotomy or stripping of the angle under the glass. The root of the iris retracts behind the blade, leaving a wake behind it which is the wall of the angle.

[†] This paper was presented in November, 1951; cases operated up to June, 1952, have been added to the statistics.

possible in most cases by an abrading of the clouded epithelium of the cornea with a keratome. As a result, goniotomy could be performed with the glass in 80 of the 86 eyes (93 percent) operated in the last three years.

If upon reexamination the goniotomy was found not to have normalized the pressure, another was performed on an adjacent part of the angle by rotating the eyeball around its axis. Any desired area of the angle can be brought into view in this manner and any part of the circumference of the angle can be operated on successively, including the temporal angle, by operating across the bridge of the nose.

In some eyes, primary operation without the glass resulted in reduction of pressure and clearing of the cornea sufficient to permit successful operation with the glass later on.

In recent years, the operation without the glass has been performed only in eyes with extreme cloudiness in which abrasion was of no avail. Even though the position of the blade after it disappears behind the limbus can be estimated with a surprising degree of accuracy, the safety of the procedure and the consistency of good results are not to be compared with the safety and results of operating with the glass under gonioscopic control.

GONIOTOMY WITH THE GLASS

At the present time the procedure may be summarized as follows:

Preoperatively a pediatric examination, including X-ray studies of the chest for enlarged thymus, is performed in all cases. Maximal miosis is obtained by the instillation of an extra drop of prostigmine (five percent) three times at half-hour intervals before operation. Ether anesthesia is administered by the intratracheal method. This assures a generous supply of oxygen, as well as complete relaxation of the patient which is important if a true measurement of the intraocular pressure is to be obtained.

Before the patient is draped, the pressure is taken with a tonometer whose base has been sterilized. The corneal diameters are measured and the condition of the cornea and size of the pupils noted.

The infant is placed on a circumcision board to facilitate the adjusting of its position. The head rests on a sponge-rubber ring. The face is prepared, and the eye irrigated in the usual manner. A face mask of dark color is used.

The surgeon operates in the standing position. For a surgeon of average height operating under the glass it is convenient for the eye to be 47 inches above the floor.

A canthotomy may be performed after the injection of a few minims of adrenalin (1:1,000) into the outer canthus. The speculum, which has been passed through two holes in a piece of dark-rubber dam six inches square, is inserted and the rubber dam trimmed. On the temporal side the dam covers the lids, preventing them from coming in contact with the knife.

The face is placed in a horizontal plane. The cornea is kept moist with physiologic saline solution applied with a glass rod. It is advisable for a presbyopic surgeon to wear a correction for a distance of seven inches.

A nurse, who stands on a stool, holds a hammer-lamp close to the right temple of the surgeon while looking down the top of the lamp so that she may have the same view of the angle as the surgeon.

The assistant fixates the eye with two Gifford forceps, sharply pointed and with spring lock, applied to the insertion of the tendons in the vertical meridian.

If corneal cloudiness prevents or disturbs visibility under the glass, a preliminary abrasion of the clouded epithelium with a keratome is performed. The assistant then rotates the head to the contralateral side and the surgical contact glass (medium size) is applied in the usual manner by injecting physiologic saline solution between it and the cornea through a Becton-Dickinson curved gold cannula and a 1.5-cc. Luer

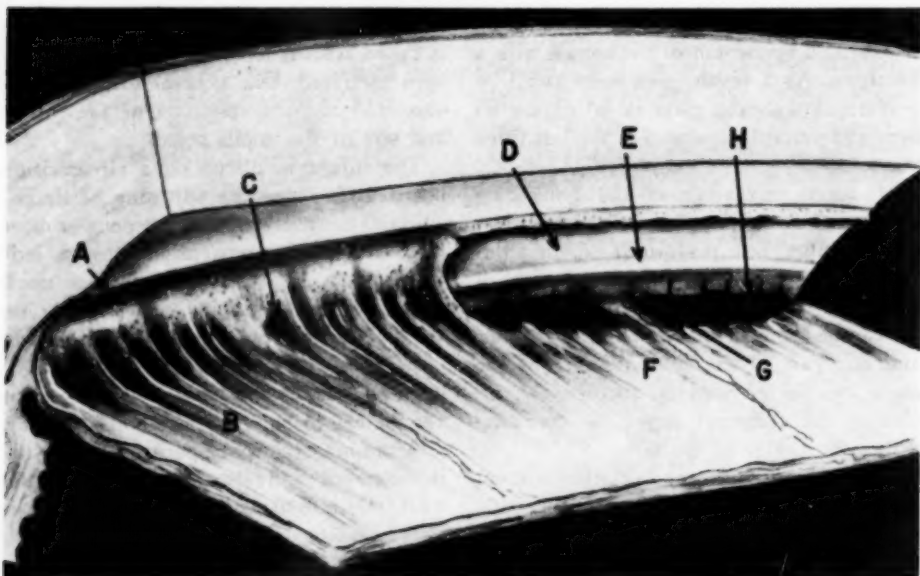


Fig. 2 (Otto Barkan). Drawing shows schematically the postoperative microgonioscopic appearance at the point of transition between the area on the right in which the angle has been stripped and the neighboring untouched region.

- A. Ring of Schwalbe.
- B. Iris stroma drawn up and inserted at ring of Schwalbe (anterior false insertion of iris).
- C. Segments of pigment epithelium, seen through stroma, are also drawn upward.
- D. Angle wall exposed.
- E. Scleral spur.
- F. Iris stroma, released and recessed from its attachment to the ring of Schwalbe, lies in a more posterior horizontal plane.
- G. The segments of pigment epithelium lie in a more posterior plane.
- H. True insertion of iris to angle wall.

(The cross section on the left of the drawing is a schematic representation of anatomic sections.)

syringe. The surgeon controls the glass with the index finger of his left hand. Two indentations on top of the glass prevent it from slipping under the finger.

With the head rotated to the contralateral side, the assistant slightly abducts the eye.

The surgeon places the glass on the nasal part of the cornea in order to expose a temporal sector of the cornea, two to three mm. wide, where the puncture is to be made. The eye having been abducted it is easy to keep the temporal area free by pushing the glass nasally.

There is no tendency for air to enter under the glass unless the glass is allowed to encroach on the area of puncture and ride

on the corneal ridge formed by the shaft of the knife. The rotated position of the head and pressure of the finger on the glass prevent ingress of air. As a result of this technique there has not been a single instance during recent years of air entering under the glass and disturbing visibility.

The puncture is made in the right eye at the 10-o'clock position and in the left eye at the 4-o'clock position, one mm. axially to the corneoscleral border and a little obliquely so that the corneal wound is like a valve or trap-door.

After crossing the anterior chamber, the point of the blade is inserted posterior to the anterior border ring of Schwalbe and is

moved counterclockwise in this plane a distance of several millimeters or one-third or more of the circumference. Experience has shown that the more superficial the blade remains, the better are the results. The blade should not disappear in the tissue for more than one quarter of its length, which means actually for not more than one-quarter to one-half of a millimeter.

An incision of the scleral wall is avoided. During the excursion of the blade, the shaft is rotated slightly around its axis in a clock-

wise direction to prevent it from moving posteriorly out of the intended plane into the region of the root of the iris. The iris retracts and falls backward, leaving a light-colored wake behind the blade.

The stripping is under complete visual control. When it has been completed, the knife is removed quickly, while pressure is exerted against the back of the blade in order to prevent enlargement of the puncture wound of the cornea. The contact glass and fixating forceps are removed. After a few

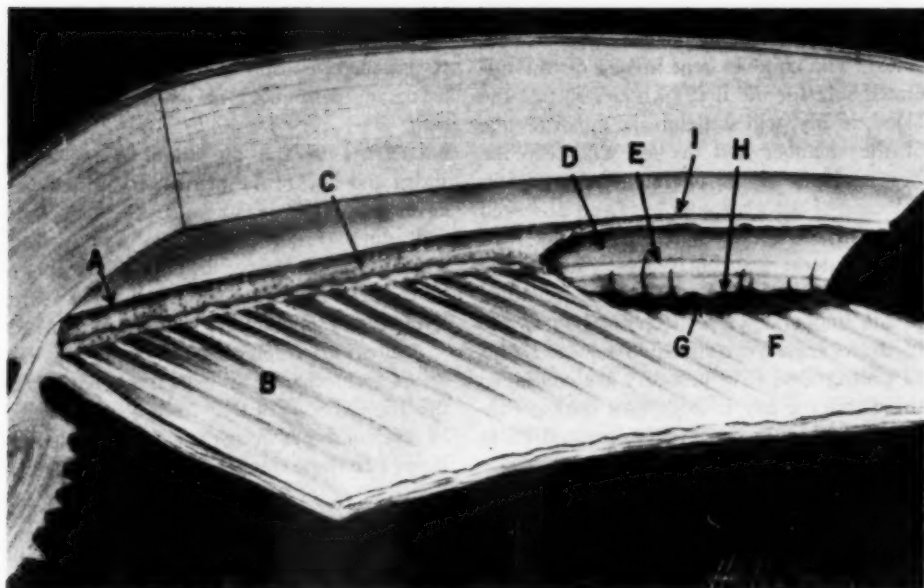


Fig. 3 (Otto Barkan). Drawing shows schematically the postoperative microgonioscopic appearance at the point of transition between the area on the right in which the angle has been stripped and the neighboring untouched region.

- A. Ring of Schwalbe.
- B. Iris stroma runs in a horizontal direction. It inserts by means of a wavy line into a semitranslucent cellophanelike surface.
- C. The cellophanelike surface is in a frontal plane and is inserted into the ring of Schwalbe. The width of this surface or membrane shows many variations.
- D. Angle wall exposed.
- E. Scleral spur.
- F. Iris stroma, released and recessed from its attachment to the ring of Schwalbe, lies in a horizontal plane.
- G. The segments of pigment epithelium lie in a more posterior plane.
- H. True insertion of iris to angle wall.
- I. Note ring of Schwalbe curving slightly upward in the region in which the attachment of the iris has been separated from it.

(The cross section on the left of the drawing is a schematic representation of anatomic sections.)

seconds a slight capillary oozing of blood, venous in color, may appear in the anterior chamber along the line of stripping; this is absorbed within a few hours.

The head is rolled onto the operated side and the anterior chamber filled with air by injecting it through the puncture wound by means of a Becton-Dickinson curved gold cannula and 1.5-cc. Luer syringe. The speculum is removed and the canthotomy closed with catgut. One drop of DFP and sulfacetimide ointment (10 percent) are inserted into the conjunctival sac.

Binocular pads are applied, the pad over the operated eye being covered with a metal shield. The child is kept in bed on the operated side for the first 24 hours so that the blood, if any, will settle on the opposite side of the chamber and the air will keep the raw surfaces of the operated region apart. No case of air glaucoma has been observed in an infant operated in this manner.

In bilateral glaucoma, prostigmine (five percent) and one drop of DFP are instilled in the unoperated eye after 24 hours, and in the operated eye after 48 hours. Drops of prostigmine (five percent) are continued three times a day in both eyes during convalescence. Only one eye is operated on at a time.

GONIOTOMY WITHOUT THE GLASS

The technique of this procedure, which is a modification of de Vincentiis¹⁰ incision of the iridic angle, has been described in a previous publication.⁸ The puncture in the cornea is made obliquely in order to encourage retention and reformation of the anterior chamber. The blade of the knife crosses the pupil and disappears behind the limbus on the opposite side in the plane just anterior to that of the iris, its tip being visible through the sclera from the outside. Seen through the cornea, the knife appears to be 0.5 mm. more anterior than it actually is. It is better to err on the conservative side by maintaining a more anterior plane, even at the risk of not stripping the angle.

Air is injected at the completion of the operation to keep the raw surfaces apart. In the last three years only six out of 86 eyes had to be operated without the glass.

ADVANTAGES, DISADVANTAGES, AND HAZARDS OF GONIOTOMY

Among the advantages of goniotomy are its high rate of success, its safety even in small infants and thus its applicability as an early operation, its freedom from late complications, the absence of cosmetic disfigurement, and the preservation of a round central, freely reacting pupil.

A disadvantageous feature is the need to repeat the operation in many cases in order to obtain permanent normalization of tension.

Hazards of the operation in the early series and before the present technique was developed were hemorrhage if the scleral wall or the root of the iris was incised. This has not occurred in any of the operations performed during the last three years. Sympathetic ophthalmia has never occurred.

A previous trephining operation does not interfere mechanically with the operation in the angle, but eyes that have been operated by cyclodialysis, or iridencleisis, are handicapped to the extent that the previously operated area of the angle is no longer accessible to goniotomy. Goniotomy, on the other hand, does not interfere with the later performance of any other type of operation.

AIR GONIOTOMY

It has been stated that goniotomy with the glass is technically difficult and that air goniotomy would be a simpler procedure. This was tried by me in 1945^{8,9} and discarded because visibility through the air-filled chamber was not comparable to that supplied by the glass. Recent observations have confirmed this earlier conclusion and have indicated that air goniotomy is in fact more complicated than operation with the glass. If the technique described in this ar-

ticle is applied, the operation with the glass should present little difficulty to one experienced in intraocular surgery.

RESULTS OF GONIOTOMY IN 178 EYES

The majority of the goniotomy patients in this series (1936-1952) have returned for repeated follow-up examinations under intratracheal ether anesthesia. Each examination has included measurement of pressure without miotics, measurement of corneal diameter, ophthalmoscopy, and diagnostic gonioscopy with a glass lens, hand slitlamp, and corneal microscope (coated oculars and objectives) mounted on a movable floor stand.^{11,12}

The remaining patients have been followed by their local ophthalmologists to whom I am indebted for their courtesy in reporting their findings.

Results have been considered successful when, after a postoperative follow-up period of at least three months, the patient's tension remains at a normal level without the use of drops and the preoperative vision has been preserved or improved.

Unsuccessful results are those in which these conditions have not been realized. When it has been impossible to follow the patient postoperatively for a minimum of three months, the final results are considered to be in doubt and the case is recorded "incomplete."

The statistical totals (table 1) include many eyes operated during the early developmental period of the surgical technique. During this period a large number of eyes had to be operated without the glass. In the later statistics (table 2), between 1948-1952, most of the eyes were operated under the glass with a simplified technique with correspondingly better results.

A total of 178 eyes have been operated during this 16-year period. Of these, 159 have complete follow-ups; 129, or 80 percent, have maintained normal pressure up to the present time without the use of miotics. In 23 eyes the patients were lost to

TABLE 1
GONIOTOMY IN CONGENITAL GLAUCOMA
TOTAL SERIES: 1936-1951

1. Total number of eyes operated by goniotomy	178
2. Number of eyes with follow-up incomplete	23
3. Number of eyes with follow-up complete	159
4. Successful (pressure normalized; vision maintained or restored)	129
5. Unsuccessful	26

follow-up prior to three months after operation and are, therefore, listed as "final results unknown." However, the results were satisfactory when the patients were last seen.

Of the 26 eyes in which the pressure remained elevated in spite of goniotomy, other surgical procedures (iridencleisis, cyclodiathermy) normalized it in 17 eyes, although with marked loss of vision. Of the remaining nine eyes, six were enucleated. There were recurrences in four eyes after from seven to 13 years. These were successfully reoperated by goniotomy.

Of the 86 eyes subjected to goniotomy in the last three-year period, 80 could be operated with the glass under gonioscopic control. This high percentage was made possible by the removal of clouded epithelium by means of a preliminary abrading of the cornea. In 71 eyes the follow-up was complete. In 62 eyes, or 87 percent, the pressure has been maintained at a normal level without the use of miotics through the minimal follow-up period or longer. In 15 eyes the final results are still in doubt.

Of the nine eyes in which pressure was not normalized by goniotomy, another surgical procedure (iridencleisis or cyclodiathermy) was effective in eight. In one eye

TABLE 2
GONIOTOMY IN CONGENITAL GLAUCOMA
1948-1952

1. Number of eyes operated by goniotomy	86
2. Number of eyes with follow-up incomplete	15
3. Number of eyes with follow-up complete	71
4. Successful (pressure normalized; vision maintained or restored)	62
5. Unsuccessful	9

the pressure has remained uncontrolled. There have been no recurrences.

In the group in which final results are known, the objective was achieved with one operation in 45, or 63 percent. In 26, or 36 percent, one or more additional goniotomies were necessary on neighboring areas of the circumference.

In 1951, 23 eyes of new patients were operated by goniotomy. All were operated with the glass.

Among the successful cases in the total series, postoperative time-intervals ranging from three months to 17 years have now elapsed. When postoperative gonioscopy has shown adequate stripping of the angle, the pressure, once normalized, has remained normal. There have been recurrences *only* in those cases in which the original stripping appears to have been inadequate. There has been little postoperative reaction.

All the eyes in the entire series showed characteristic malformations of the angle as the presumable cause of the increased intraocular pressure. Failure to relieve it by goniotomy appears to have been due to the formation of scar tissue as a result of surgical trauma or in the severe cases at birth to insufficient development of Schlemm's canal and its emissaries. In all cases in which gonioscopy indicated that aqueous fluid had been given adequate access to the region of Schlemm's canal mechanism, without injury or scarring of the latter, intraocular pressure was normalized (figs. 2 and 3).

GLAUCOMA ASSOCIATED WITH ANIRIDIA

This condition has in the past responded poorly to surgical intervention. Goniotomy under the glass has recently been performed with good result in the case of an infant, aged two months, afflicted with glaucoma associated with aniridia. The tension was: R.E., 70 mm. Hg; L.E., 25 mm. Hg (Schiøtz). Goniotomy under the glass on

the right eye on June 9, 1951, reduced tension to normal. At the present time, 10 months postoperatively, the tension is: R.E., 25 mm. Hg; L.E., 25 mm. Hg (Schiøtz) without miotics.

No conclusion can be drawn from an isolated case but the good result in this case encourages the hope that goniotomy may in the future prove effective in similar cases. A detailed report of the case is being published in another article.

SUMMARY

Goniotomy performed on 178 eyes afflicted with infantile glaucoma preserved useful vision in most cases. In 129 eyes pressure was normalized and vision maintained or restored. In those cases in which the diagnosis was made early, the operation insured vision sufficient to permit the child to attend ordinary schools. The operation was unsuccessful in 26 eyes.

In the last three years by virtue of improvements and simplifications in technique it has been possible to operate with the glass under gonioscopic control on eyes in which this procedure would formerly have been impossible.

A case of glaucoma associated with aniridia was operated successfully by goniotomy.

A plea is made for the early diagnosis of congenital glaucoma and for prompt, adequate operation by goniotomy. The operation should be performed under gonioscopic control whenever possible. If, soon after its onset, increased intraocular pressure is normalized by goniotomy, transparency of the cornea is almost completely restored and maintained, and vision is afforded an opportunity to develop. The urgency of prompt relief of the increased pressure is stressed.

490 Post Street (2).

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CATARACTS IN GALACTOSEMIA

OBSERVATIONS IN THREE CASES

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The inability to metabolize galactose normally in infancy has been reported under the titles galactosemia, galactosuria, or galactose diabetes. The disease is characterized by hepatomegaly, cataracts, weight loss, and high blood and urine galactose levels.

Proper recognition of the cataracts associated with it aids greatly in early identification of this metabolic disorder; it is, therefore, important that the ophthalmologist be familiar with this disease. Untreated, galactosemia is frequently fatal; however, on simply removing galactose from the diet, a dramatic clinical improvement occurs, with regression of cataracts, return of the liver to normal size, weight gain, and termination of the galactosuria and galactosemia.

The number of galactosemia cases reported, although small, is steadily increasing. Pediatricians familiar with the disorder usually know of cases which are unreported; an even larger number of cases were probably unidentified since the patients died in infancy with undiagnosed hepatomegaly.

Identification of the urinary reducing sugar is done by the yeast fermentation test. Both glucose and galactose reduce Bene-

dict's solution; galactose, however, fails to ferment yeast, whereas glucose causes complete fermentation. A galactose-tolerance test may be done to substantiate the diagnosis further. These patients show a marked intolerance to ingested galactose and the curve resembles that of a diabetic to glucose-tolerance tests.

Apparently the first recorded case of galactosemia was that of the patient of Von Reuss¹ reported in 1908. An analysis of cases reported subsequently reveals that cataracts were noted in most infants whose eyes were carefully examined.

Further information was requested from authors who had not cited detailed ocular examinations in their patients or who had not observed cataracts at the time of their original case reports. The ocular findings of the published cases and from communications with the authors are tabulated in Table I.

The cataracts that have been observed in clinical galactosemia are variable in type and are apparently determined by the age of the infant and the duration and severity of the galactosemia. In the earlier stages the most commonly observed defect is a

TABLE 1
OCULAR FINDINGS IN PUBLISHED CASES OF GALACTOSEMIA

Author	Year	Age when Diagnosed	Sex	Ocular Findings
Von Reuss ¹	1908	8 mo.	M	Eye exam. Not recorded
Goppert ²	1917	2½ yr.	M	Not recorded
Boer ³	1932	7 yr.	F	Eye. Not recorded
Fanconi ⁴	1933	9 yr.	M	Zonular cataracts progressing to needling and discissions (2 older sisters had zonular cataracts)
Mason and Turner ⁵	1935	6 mo.	M	Cataracts not cited in orig. report. Dense nuclear cataracts, noted at age 4, needled with final vision 20/30 O.U.*
Norman and Fashena ⁶	1943	11 wk.	M	Cataracts not cited in report. However lamellar cataracts, noted at 5 yr., needled. Corrected vision: R.E., 20/80; L.E., 20/40*
Bruck and Rappoport ⁷	1945	7 wk.	M	Sharp refractile annular zone in center lens with disappear. opacity after removing gallactose
Mellinkoff ⁸ and others	1945	2 mo.	M	Not cited in case report. Subsequent follow-up showed no lens opacities*
Goldbloom and Brickman ⁹	1946	6 mo.	M	Dense central opacities bilat. Slight clearing at 14 mo. At 6½ yr. bilat. needling*
	1946	3½ mo.	M	Bilateral "pinpoint" central opacities at 3½ mo. 9½ mo., central anterior opacity 1.5 mm., O.U. 5 yr., opacities had prog., bilateral needling*
	Not reported	1 yr.	M	"Central posterior subcap. incomplete opacities bilat."*
	Not reported	13 da.	M	Incipient lens opacities at 13 days, on galactose-free diet prophylac. since birth*
Goldstein and Ennis ¹⁰	1948	2½ mo.	M	Central refractile ring suggesting lenticonus bilat. (Case 1)
Greenman and Rathbun ¹¹	1948	18 wk.	M	Bilat. nuclear cataracts; partial clearing after removing galactose
Bell and others ¹²	1950	Birth	M	Sibling of above case. No evidence of cataract up to 7 mo.
Donnell and Lann ¹³	1951	2 wk.	F	Lamellar cataracts at 5 mo. unchanged 8 mo. on galactose-free diet
		13 mo.	M	At 14½ mo. "cataracts were seen bilat." No change 7 mo. on galactose-free diet
Townsend and others ¹⁴	1951	6 mo.	F	Nuclear and periph. opacities unchanged at one yr. At 4½ yr. slight clearing
		6 wk.	F	Cataracts did not devel. in follow-up 8 yr.
		Birth	M	Sibling of above. Always on galactose-free diet, prophylac. No cataracts in follow-up through 20 mo.
Falls and others ¹⁵	1951	5 mo.	F	No cataracts in follow-up through 23 mo.
		8 wk.	F	Opalescent nebular subcap. opacity just beneath cap. in both lenses. "Nuclear areas likewise somewhat opalescent." Follow-up in 2 mo., no change
Enns ¹⁶	1951	6 wk.	M	Homogeneous opacity of nuclear areas both lenses with small equat. cortical vacuoles. By slitlamp area of diffuse relucency of fetal & embryonal nuclei with a few brilliant white opacities. At 7 mo. with reduced illumination with ophthalmoscope faint nuclear or perinuclear haziness
DuShane and Hartman ¹⁷	1951	4½ mo.	M	No mention cataracts orig. report. Careful examination showed no opacities*
Patz	1952	8 wk.	M	Central refractile annular zone at surface of fetal nucleus (Case 2)
	1952	3 wk.	M	Central refractile annular zone at surface of fetal nucleus. Cortical vacuoles (Case 3)
Reiter and Lasky ¹⁷	1952	7 wk.	M	Lamellar opacity with central annular zone sharply delineated; cortical vacuoles followed. Clearing of opacities on galactose-free diet

* Personal communication.

lamellar opacity which presents a central ring pattern resembling lenticonus. Cortical vacuoles may be seen concomitantly or may develop afterward.

Lamellar separation and advanced nuclear and cortical opacities have been observed. Here the cataracts have responded to routine needling or linear extraction. No untoward surgical complications have been encountered and these eyes withstand surgery in a routine manner.

CASE REPORTS

Three cases are presented which were observed by me during the initial period of galactosemia and which have been followed while the infants were on a galactose-free diet.

Case 1 has been followed over a period of five and one-half years through the courtesy of Dr. Eugene Goldstein and Dr. John Askin, Baltimore, Maryland. Case 2 has been followed for four years through the Ophthalmology Department, Gallinger Municipal Hospital, Washington, D.C., on the service of Dr. William D. Foote. Case 3 has been followed for 11 months through the courtesy of Dr. Milton Markowitz, Baltimore, Maryland.

CASE 1

W. L. J. This case was previously reported by Goldstein and Ennis¹⁰ in 1947. A more detailed description of the original eye findings and ocular follow-up over a five and one-half year period are cited here:

On examination in June, 1947, when the diagnosis of galactosemia was first made, the lenses presented a refractile annular zone centrally in each lens (fig. 1). On ophthalmoscopic examination the lenses showed the typical "oil drop" effect of lenticonus. The refractile zone did not interfere with visualization of the fundus. The balance of the ocular examination was negative in each eye.

Examination five days later revealed essentially the same lens picture. After two

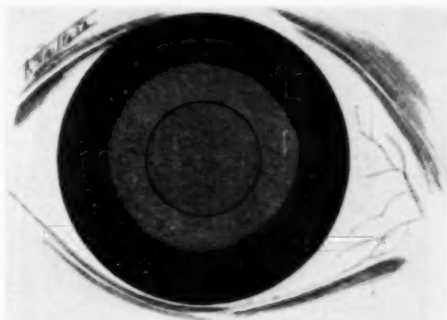


Fig. 1 (Patz). CASE 1. Artist's sketch of lamellar ring opacity resembling oil-drop effect of lenticonus. Opacities were identical in each eye.

months on a galactose-free diet, there was no residual of the annular opacity which had been observed previously. Slitlamp examinations were not done at this time.

The child remained on a reasonably strict galactose-free regime during the subsequent five and one-half years. Physical development was essentially normal; however, there was definite mental retardation.

At the age of three years, the lenses were transparent and, on direct observation, no opacification was noted. By retroillumination with the ophthalmoscope, however, a fine mottled disciform haze was seen centrally in each lens. These opacities were symmetrical in each eye. Slitlamp examination revealed fine punctate glistening opacities on

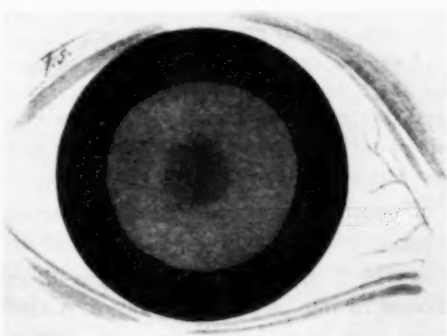


Fig. 2 (Patz). CASE 1. Three years after infant had been on a supposedly rigid galactose-free diet. Note fine stippled disciform opacity on retroillumination with ophthalmoscope.

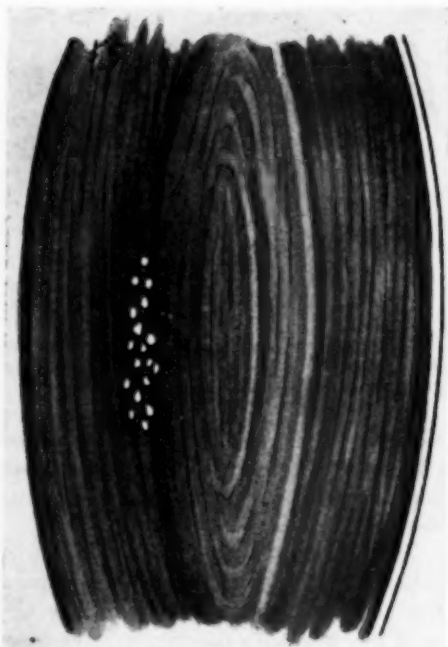


Fig. 3 (Patz). CASE 1. Slitlamp appearance of Figure 2, showing glistening punctate opacities at surface of fetal nucleus.

the posterior surface of the fetal nucleus (figs. 2 and 3).

No new cortical opacities were noted and examinations during the following year and a half have revealed no essential change in the lenses. Particular attention has been given to the equatorial region in looking for new cortical opacities.

Examinations periodically from the age of three to four and one-half years have revealed no new opacities. The fine mottled disciform opacity on the posterior fetal nucleus has remained unchanged during this time.

CASE 2

H. N. T. A brief summary of the clinical course of this patient is cited here. A complete case report, with details of galactose tolerance studies, liver biopsy, and sibling autopsies will be published in the pediatric literature.

This white male infant was admitted to the Gallinger Hospital at the age of two months with a history of marked weight loss, vomiting, and hyperirritability.

Examination revealed a severely malnourished child with marked hepatomegaly. The urine sugar showed four-plus reduction with Benedict's solution.

Examination showed the eyes to be completely normal excepting the lenses. The pupils were dilated and a sharply delineated refractile annular zone in the centers of each lens was detected (fig. 4). Slitlamp examination under heavy sedation, although not wholly satisfactory due to the child's movements, revealed a sharp zone of demarcation at the surface of the fetal nucleus. A distinct opacity could not be detected. The lens findings were symmetrical and practically identical in each eye. Knowledge of the occurrence of this type of opacity in galactosemia aided greatly in establishing proper diagnosis.

The urine was subsequently analyzed by yeast fermentation and the sugar identified as galactose. A galactose-tolerance test revealed a typical curve showing intolerance to galactose. A liver biopsy showed definite early cirrhosis of the portal type.

Milk was removed from the diet and the patient showed a dramatic clinical improve-

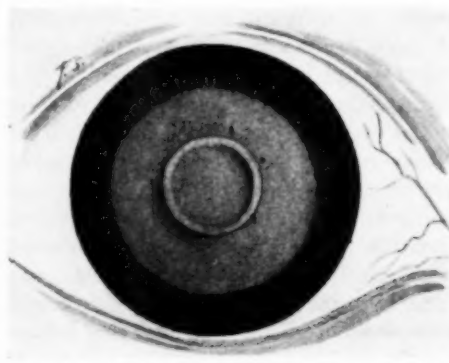


Fig. 4 (Patz). CASE 2. Showing lamellar ring opacity centrally. Fine cortical opacities are also noted on retroillumination with the ophthalmoscope. The opacities are symmetrical in each eye.

ment. The eyes were examined ophthalmoscopically at two-day intervals. By the ninth day on a galactose-free diet the annular zone was barely discernible and by the 17th day no residual opacity could be detected with the ophthalmoscope or slitlamp.

The child was seen again at the age of three, six, nine, and 12 months, and no opacities were detected. The patient did not return again for a follow-up until the age of 38 months.

Examination at this time revealed a normally developed healthy youngster who showed no mental retardation. Vision was normal on examination. On dilating the pupils, the lenses showed a fine haze about the fetal nucleus with retroillumination by the ophthalmoscope. No opacity could be detected on direct illumination.

Slitlamp examination revealed several glistening punctate or fine irregular opacities on the surface of the fetal nucleus and a few minute opacities in the subcapsular cortex (figs. 5 and 6). These did not interfere with visualization of the fundus, normal, O.U.

Two siblings of this patient had died presumably from galactosemia several years earlier. Both siblings had spilled four-plus urine sugar consistently and had markedly enlarged livers. Autopsy showed a fatty infiltration and early cirrhosis of the liver in each case.

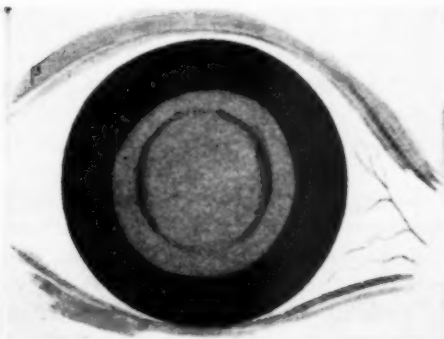


Fig. 5 (Patz). CASE 2. Three years after infant had been maintained on a galactose-free diet. Note fine punctate opacities at the posterior nuclear surface.

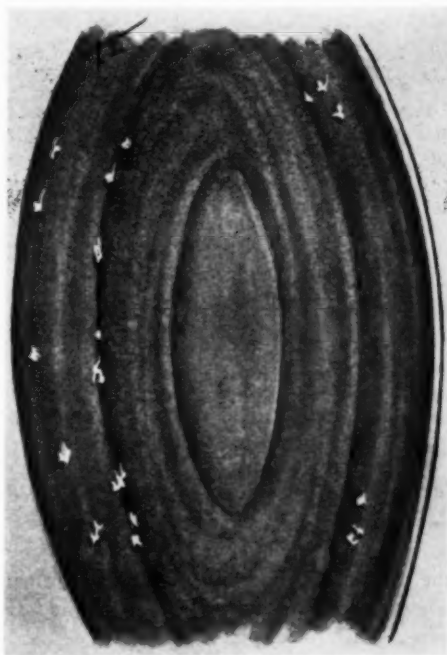


Fig. 6 (Patz). CASE 2. Slitlamp appearance of Figure 5, showing scattered glistening punctate opacities.

CASE 3

C. T. The infant was seen at the Sinai Hospital, Baltimore, where a diagnosis of galactosemia was made at the age of three weeks. The infant presented a rather typical picture with a history of weight loss, vomiting, enlarged liver, galactosemia, and an intolerance to galactose on tolerance studies.

Examination of the eyes revealed the lids, conjunctivas, corneas, and irises to be normal. No opacity was noted in the lenses with direct illumination.

On retroillumination with the ophthalmoscope a sharply demarcated, thin, refractile ring was noted in the central zone of each lens (fig. 7). An occasional vacuole was noted just peripheral to this ring. The opacities were symmetrical in each eye. There was no interference with visualization of fundus details and all structures appeared normal. Slitlamp examination was not done.

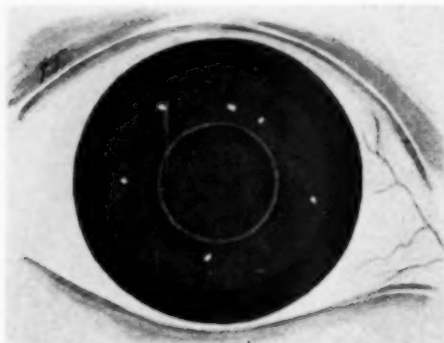


Fig. 7 (Patz). CASE 3. Showing lamellar ring opacity and scattered cortical vacuoles as seen ophthalmoscopically.

Follow-up examination two weeks after institution of a galactose-free diet revealed no residual lens opacities. Subsequent examination at two-month intervals through the age of 11 months have revealed normal lenses with no new opacities noted at any time.

DISCUSSION

Although a specific hereditary pattern has not been demonstrated, galactosemia seems definitely to be genetically determined. The reports of Boldbloom,⁹ Goppert,² Boer,³ Donnell and Lann,¹³ and Townsend, Mason, and Strong,¹⁴ cite apparent galactose disease in the siblings of their patients. The two siblings of the patient in Case 2 reported here indicate a familial involvement.

The pathogenesis of this disease is still not clearly understood. Mellinkoff,⁸ suggested that galactose itself is stored in the liver and is directly toxic to the hepatic cells. Bell and associates¹² have adequately demonstrated that the hepatic enlargement and dysfunction in these cases are due to fatty infiltration of the liver parenchymal cells.

Bruck and Rappoport⁷ noted a diminution of galactose intolerance when glucose infusions were supplemented in patients with galactosemia. They suggested that galactose and glucose compete for the same liver enzyme system.

Greenman and Rathburn¹¹ found that simultaneous administration of glucose reduced the intolerance to galactose administered intravenously in patients with galactosemia. Townsend and others,¹⁴ suggested that an associated hypoglycosemia with this disease may account for some of the damaging effects of the disorder.

When liver biopsy or autopsy material has been obtained, a picture of fatty infiltration or frank Laennec's cirrhosis has been observed. The mental retardation possibly represents a direct toxic effect of galactose on the central nervous system.

The mechanism of cataract formation in this condition is apparently a direct toxic effect of circulating galactose in the aqueous. Supporting this concept are the following observations: Bruck and Rappoport⁷ found spinal-fluid galactose levels approaching those in the blood stream in galactosemia. It is reasonable to assume that galactose diffuses freely into other body fluids and that galactose levels in the aqueous approach those in the blood stream of these patients. In galactosemic animals the aqueous galactose level is markedly elevated.

The precise mechanism of the toxic action of the circulating galactose upon the lens fibers is not clear. Kirby¹⁸ demonstrated that galactose was more toxic than other sugars to lens epithelium grown in tissue culture.

Bellows and Rosner¹⁹ found a decreased permeability of the lens capsule in galactosemic animals. Bellows and Chinn²⁰ suggested that the elevated sugar in the aqueous exerted an injurious osmotic effect on the lens.

Lastly, Rosner, Farmer, and Bellows²¹ demonstrated a reduction in lens glutathione and vitamin-C content in galactosemic animals, this depletion being recorded even prior to the slitlamp or histologic demonstration of lens opacities.

It is possible that the lens damage is mediated through a combination of these factors, namely alteration of capsule per-

meability, depletion of sulfhydryls, injury to lens epithelium, and osmotic effect. High aqueous galactose also might interfere with normal utilization of glucose by the lens.

Buschke^{22, 23} postulated that the subcapsular vacuoles seen in human diabetic cataracts were equivalent to vacuoles observed in galactose, xylose, and experimental diabetic cataract. Buschke also has stated that the occurrence of clusters of vacuoles at the equator in the superficial cortex strongly suggests that osmotic disturbances play a major role in the pathogenesis of this group of cataracts.

The regression of lens opacities on removal of galactose from the diet has been abundantly illustrated in clinical and experimental subjects.^{7, 10, 11, 24} In rats, studied by ophthalmoscope and slitlamp examination, early opacities were seen to clear completely after stopping galactose.

Gifford and Bellows,²⁵ however, demon-

strated histologically residual lens fiber damage in cases that were clear ophthalmoscopically. They showed that the new healthy cortical fibers had simply compressed the damaged fibers centrally.

In view of this known regression of galactosemia cataracts, it is significant to note that new lens opacities occurred after removal of galactose in the patients of Mason and Turner,⁵ Goldbloom and Brickman,⁹ Norman and Fashena,⁸ and in Cases 1 and 2 presented here.

The opacities that developed while the patients were on a galactose-free diet can be explained by one of two mechanisms: (1) From a failure to maintain a strict galactose-free regimen, with temporary periods of galactosemia occurring; (2) the original galactosemic insult prior to the removal of galactose from the diet could, theoretically, permanently damage the lens capsule or epithelium. New fibers laid down in later life

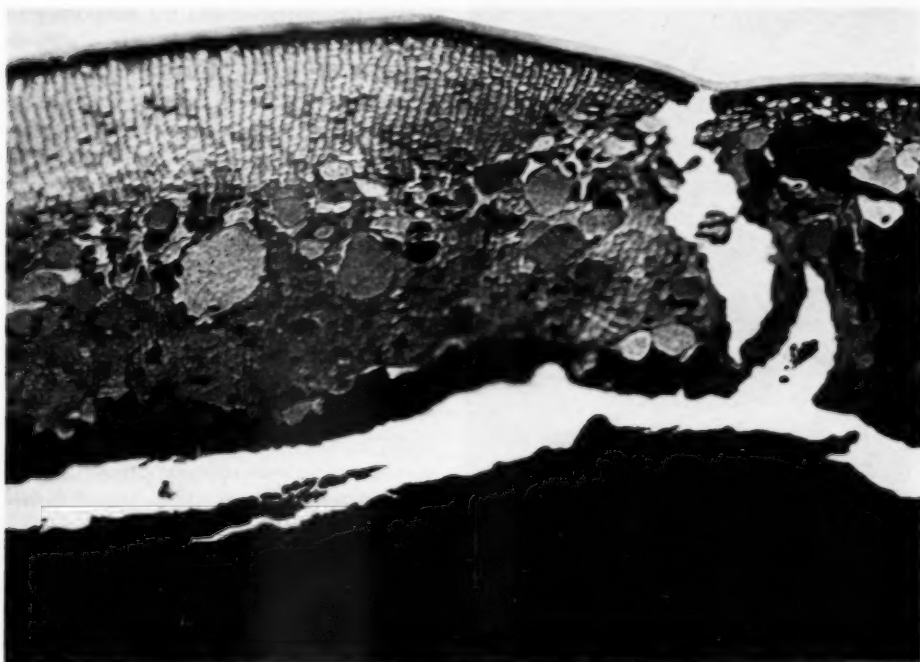


Fig. 8 (Patz). Photomicrograph of cortical zone of lens of a 39-day-old white rat. Animal received 25-percent galactose in diet for 18 days after weaning. ($\times 205$.)

could be defective as a result of the original injury during galactosemia.

To evaluate this second mechanism in the laboratory the following study was performed.

EXPERIMENTAL OBSERVATIONS

Forty-four weanling white rats (21 days of age) were placed on a nutritionally complete diet containing 25-percent galactose for 18 days. Typical clusters of cortical vacuoles, lamellar separation, and a diffuse perinuclear haze appeared in all the animals.

On the 18th day the opacities were carefully recorded in each animal and galactose was withdrawn from the diet. These rats were then examined monthly by ophthalmoscope and slitlamp over a period of 22 months while they were on a stock diet. At

22 months the animals were killed and the eyes examined histologically. (Two animals died during this study.)

During the follow-up period after galactose had been discontinued a progressive compression of the opacities toward the nucleus was noted in each animal as clear fibers were laid down. At no time during the period after removal of galactose were new cortical opacities noted to develop. Particular attention was given to the equatorial cortex for the appearance of new lens vacuoles.

Microscopic examination of the eyes of the 42 surviving animals after 22 months on stock diet revealed perfectly normal cortical lens fibers and epithelium, with the degenerated fibers compressed to the center of the lens (figs. 8 and 9). No sections showed evidence of recent cortical fiber damage. The regressive changes conformed to the earlier observations of Bellows and other workers.

From the findings in this group of animals, it was demonstrated that the temporary initial galactosemia did not interfere with the ability of the rat lens later to lay down perfectly healthy fibers. These findings suggest that in human galactosemia the original temporary insult to the lenses of affected infants while they are galactosemic should not interfere with the formation of normal new lens fibers later. Thus, new opacities observed clinically in patients on galactose-free diets would seem to indicate that periods of galactosemia have probably occurred.

The application of this cataractogenic effect of galactosemia is recommended in evaluating therapy. In periods of galactosemia, cortical vacuoles which are easily observed ophthalmoscopically develop rapidly. Careful ocular examinations would provide a valuable indicator in the management of these patients.

It is strongly recommended that the ophthalmologist cooperate in the long-term care of the patients. A careful examination through dilated pupils should be done periodically.



Fig. 9 (Patz). Litter mate of white rat shown in Figure 8. Animal received 25-percent galactose for 18 days after weaning, then stock diet for 22 months. Note normal superficial cortex with old damaged fibers compressed centrally. ($\times 100$.)

During the first year, while the patient is on a galactose-free diet, examination at four-to-six week intervals is advised. Afterward examinations approximately three to four times yearly seem practical.

Because of the rapid cataractogenic effect of galactose, the advisability of frequent repetition of galactose-tolerance tests should be questioned, once a diagnosis has been clearly established.

Bellows²⁴ and Mitchell and Cook²⁶ demonstrated that a low-protein diet hastens the development of cataracts in animals fed galactose. These workers also demonstrated that large amounts of cystine in the diet delayed the onset of experimental galactose cataracts. From these observations the administration of a high protein diet is recommended in clinical cases for its possible inhibitory effect on cataract formation.

SUMMARY

An analysis of the cataracts observed in reported cases of clinical galactosemia is tabulated. The most commonly observed

opacity appears as a central refractile ring resembling the "oil drop" effect of lenticonus. Clusters of cortical vacuoles and various forms of zonular cataract have been observed.

In view of the rapid cataractogenic effect of galactosemia, periodic examinations by the ophthalmologist are advocated in the management of these patients. The appearance of new lens opacities probably indicates a failure to maintain a strict galactose-free regimen.

Critical observations on experimental galactosemic cataracts revealed that temporary galactosemia does not interfere with the ability of the rat lens to form healthy new fibers after termination of the galactosemia.

The ocular findings in three galactosemic patients who have been followed over a period of from 11 months to five years are presented.

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I am indebted to Mrs. Ann B. Eastham for the histologic preparations and to Miss Frances Schultz for preparing the illustrations.

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POSTERIOR HALF-INCISION OF CORNEA FOR ASTIGMATISM*

OPERATIVE PROCEDURES AND RESULTS OF THE IMPROVED TANGENT METHOD

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Posterior half-incision of the cornea¹ for astigmatism consists of an incision which is tangent to and another which is radial to the pupil. Recently the technique has been improved and made more effective. The tangent form is useful for direct astigmatism and the radial form is appropriate for inverse astigmatism.

In addition, there is another way of combining the method of separating the middle layers of the cornea and the posterior half-incision of the cornea,² which permits grouping the operation of posterior half-incision of the cornea for astigmatism into three different forms. In this report only the tangent form will be presented (fig. 1).

This method for the correction of astigmatism is, as shown in Table 1, effective up to 4.75 diopters, and it is not rare for persons who have had severe astigmatism to find the cylinder lenses absolutely unnecessary after this operation.

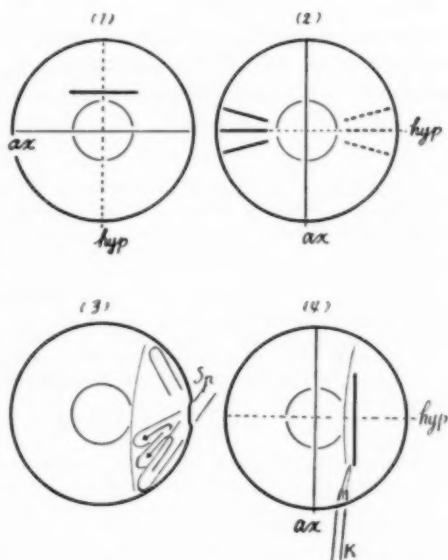


Fig. 1 (Sato). Three kinds of posterior half-incision of cornea for astigmatism: (1) Tangent method. (2) Radial method. (3 and 4) Tangent method combined with the separation of the middle layer; (K) Corneal knife in the anterior chamber; (ax) axis of the astigmatism to be operated on; (hyp) a meridian of the cornea in which the most effective hypermetropization appears; (Sp) spatula in the interstitium.

*From the Juntendo Medical College. A condensation of the report presented before the Tokyo Congress of Ophthalmology, December, 1950.

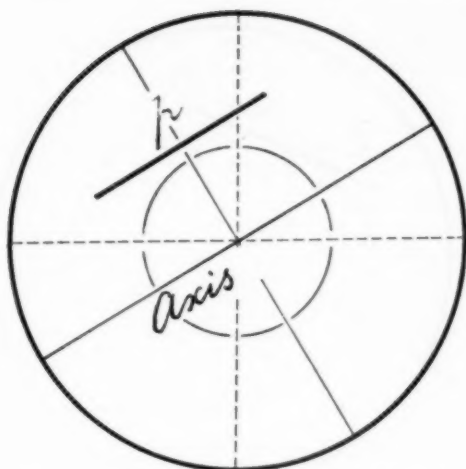


Fig. 2 (Sato). The incision is made parallel to the axis of astigmatism.

The method is as indicated in the figures. FIGURE 2. The degree and the axis of the astigmatism is tested with refractometer. The incision of approximately five mm. is carried out on the posterior layers of the cornea parallel to the axis of the astigmatism. The midpoint of the incision (P in Figure 1) is placed on the meridian of the cornea where the refractory power of the

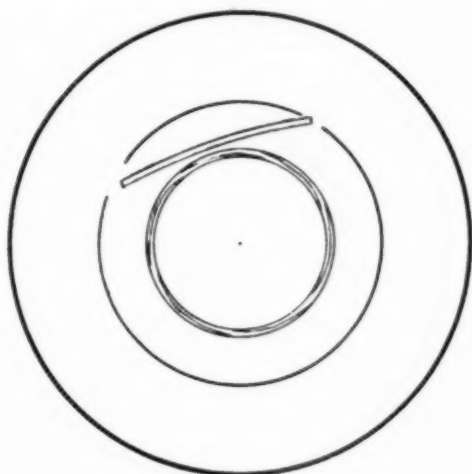


Fig. 3 (Sato). Gray human hairs are used to guide the operation.

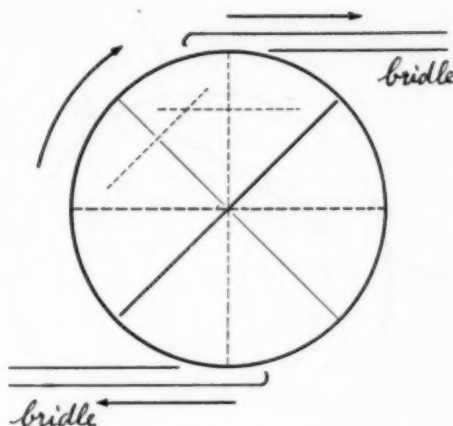


Fig. 4 (Sato). Illustrating the use of bridle sutures.

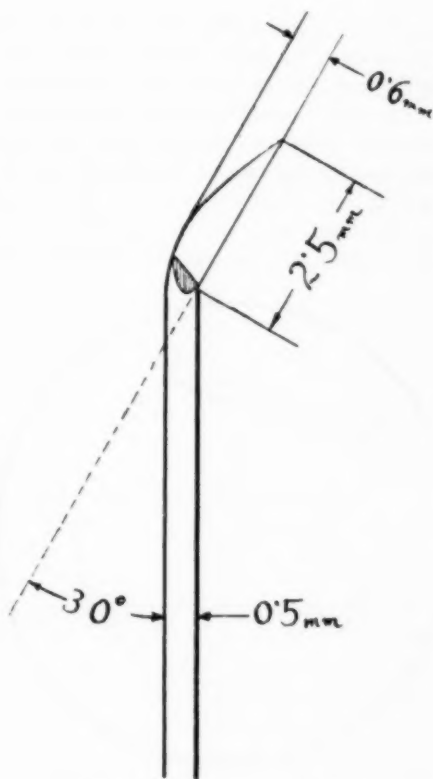


Fig. 5 (Sato). The corneal knife.

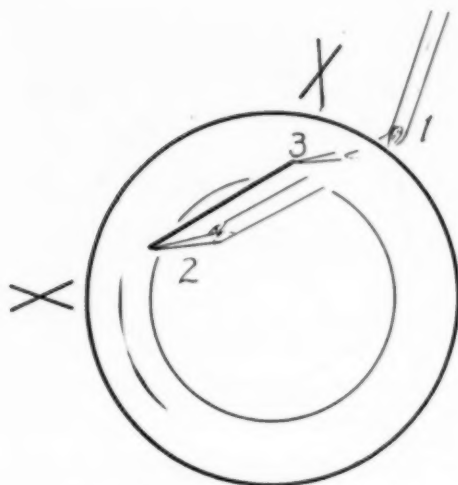


Fig. 6 (Sato). Illustrating the use of the corneal knife.

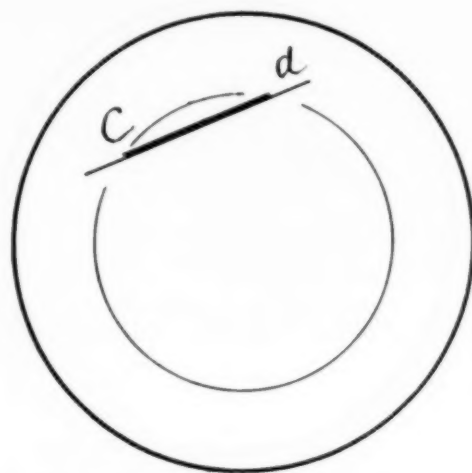


Fig. 8 (Sato). The wound is deepened.

eye is the greatest. The incision is carried out, keeping in mind to incise tangentially to the pupil which is six mm. in diameter.

FIGURE 3. Enough mydriasis is obtained by atropine. Two gray human hairs, one approximately five mm. in length and another in ring form (diameter five mm.), are placed on the cornea to guide the operation. In order to place the ring correctly, the eye to be

operated on is focused directly on the operator's eye (the eye which the operator uses habitually). The gray hair, if interwoven like the wire hoops on a barrel, can easily be made into a ring.

FIGURE 4. If it is difficult to operate because the slant of the axis of astigmatism is too great, place two bridlesutures in the sclera on the upper and lower side of the

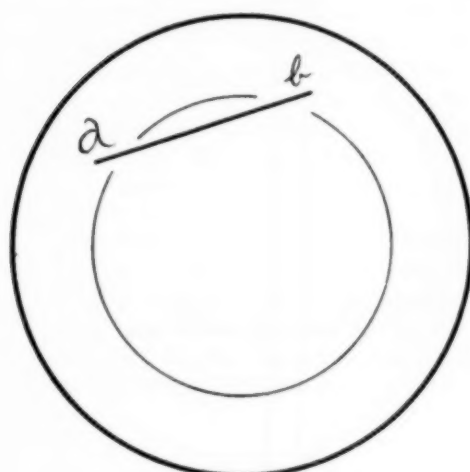


Fig. 7 (Sato). The cornea is incised from a to b.

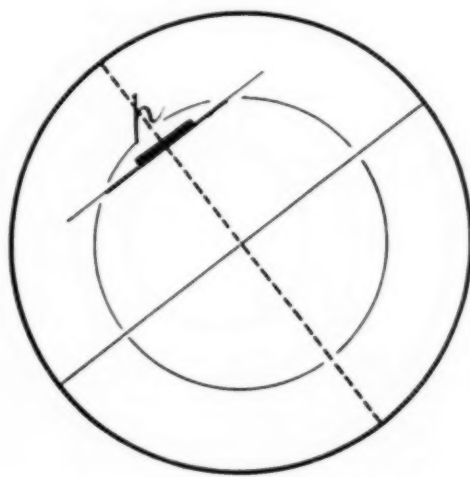


Fig. 9 (Sato). If necessary, the incision may be repeated.

TABLE I

EFFECT OF THE TANGENT TYPE OF POSTERIOR HALF INCISION OF CORNEA ON THE ASTIGMATISM

No.	Age (years)	Sex	Eye	Diagnosis	Refraction before Operation	Refraction after Operation	Astigm. before Operation	Astigm. after Operation	Astigm. of Operation
1	9	F	R	Ast. myop. directus	-3.25 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -6	-2.25 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -5	2.75	2.75	0
			L	Ast. myop. directus	-2 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -5.5	-2.75 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -3.5	3.5	0.75	2.75
2	9	F	R	Ast. mixed directus	+2.75 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -1.75	+2.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -0.25	4.5	2.75	1.75
			L	Ast. mixed directus	+3 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -0.75	+2.75 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ +2.25	3.75	0.5	3.25
3	18	F	R	Ast. mixed directus	+1.0 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -4.5	0 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -3	5.5	3.0	2.5
4	13	F	R	Ast. myop. direct	-1.75 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -7.25	-1.75 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -4.25	5.5	2.5	3.0
5	18	F	R	Ast. myop. direct	-1.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -5	-3 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -4.5	3.5	1.5	2.0
6	19	F	R	Ast. myop. direct	-1.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -7	-3 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -4.5	5.5	1.5	4.0
			L	Ast. myop. direct.	-1.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -6	-3.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -4.5	4.5	1.0	3.5
7	20	F	R	Ast. myop. direct	-4.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -7	-4.0 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -5	2.5	1.0	1.5
8	25	M	R	Ast. myop. direct	-4 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -6.25	-4.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -4.5	2.25	0	2.25
			L	Ast. myop. direct	-1 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -5.75	-2.75 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -3.5	4.75	0.75	4.0
9	21	M	R	Ast. myop. direct	-6 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -8	-6 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -7	2.0	1.0	1.0
10	33	M	R	Ast. myop. direct	-2 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -7	-2 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -2.25	5.0	0.25	4.75
11	11	F	L	Ast. myop. direct	-2.5 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -6	-1.75 $\begin{smallmatrix} - \\ + \end{smallmatrix}$ -3.25	3.5	1.5	2.0

limbus, as shown in Figure 4. Have an assistant pull them in the opposite direction (right and left) and the operation will be easier.

FIGURE 5. The kakumakuto (corneal knife) with which I am able to perform the posterior incision without a leak of the aqueous has been redesigned and made thinner than the one reported in the AMERICAN JOURNAL OF OPHTHALMOLOGY.¹ The width of the blade and the diameter of the shaft of

the knife must be in the correct ratio.

FIGURE 6. Grasp the point marked X with fixation forceps. From the limbus of the cornea, thrust the corneal knife into the anterior chamber. When piercing the cornea, keep the side of the knife parallel to the surface of the iris. When the anterior chamber is reached, the tip of the blade is always pointed toward the cornea.

FIGURE 7. The cornea is incised from *a* to *b*, guided by the preplaced gray hair. The



Fig. 10 (Sato). Clouding of the cornea.

interstitium, including endothelium and Descemet's membrane, will be cut half its thickness with this first incision.

FIGURE 8. The wound is deepened by following the part indicated by the heavy line *c* to *d*.

FIGURE 9. The point *p* is once more traced and perforated. Repetition of the incision is not limited to three times. If the astigmatism is below two diopters, it is not always necessary to perforate, but the center must be made deep enough.

FIGURE 10. There is clouding of the cornea for several weeks after the operation. This will be recognized only by careful examination in a dark room.

SUMMARY

Severe astigmatism, astigmatism of slanted axis, and all other forms which cannot be corrected by glasses may be treated by my posterior half-incision of cornea. In my experience, the operation is indicated for all astigmatisms over two diopters.

Juntendo Medical College.

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OPHTHALMIC MINIATURE

An Ointment for Eye Diseases

Collect the juice of these twelve herbs: fennel, rue, verbena, betony, agrimony, benedicta, germandria, burnet, fragula, eyebright, and sage. Mix them, and slowly add the urine of a chaste youth. Pour this mixture into a mortar with some grains of pepper; add two spoonsful of Attic or prepared honey and such additional urine as will bring them, when well ground, to the consistency of an ointment. Transfer the compound to a new jar, adding from time to time as much urine as is required to maintain the semi-fluid state. This powerful ointment is useful as an application in all forms of ocular disease, especially in chronic diseases of the albuginea. It restores light. Having tried it you will believe.

Benevenutus Grassus of Jerusalem
De Oculis Eorumque Egritudinibus et Curis,
 Translated by Casey A. Wood, 1929

MANAGEMENT OF EYE CASUALTIES IN THE FAR EAST COMMAND DURING THE KOREAN CONFLICT

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INTRODUCTION

For the past three years, it has been my privilege to act as consultant in ophthalmology to the chief surgeon, Far East Command, in addition to being assigned as ophthalmologist at the Tokyo Army Hospital, Tokyo, Japan. During the period between June 25, 1950, and August 25, 1952, approximately 6,500 patients with eye injuries or diseases were evacuated to Tokyo Army Hospital. This represented approximately 70 percent of all eye cases evacuated from Korea.

The tempo of the war subsided considerably during the months of the continuing armistice negotiations at Panmunjom. During this lull, approximately 12 cases of eye injuries occurred daily from battle wounds.

In this same period, 218 enucleations were performed, but many more were done at evacuation hospitals in Korea. There were wounds of both eyes in 402 cases, of which 116 patients, including wounded from other United Nations forces, were evacuated to Tokyo Army Hospital with less than 20/400 best corrected vision in the better eye. These will require blind rehabilitation. These bilateral injuries were chiefly due to land-mine explosions and artillery fragments.

Realizing that very few front-line surgeons had any training in ophthalmology, the necessity for prompt evacuation of patients to installations capable of rendering expert care was stressed. During the early days of the war, this meant immediate air evacuation to Japan but, when ophthalmologists were available for assignment to the evacuation hospitals, such definitive treatment could be performed earlier.

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It has always been a standing rule that eye casualties must arrive at such a hospital where an ophthalmologist is assigned within 24 hours after injury, and sooner if possible. Most cases arrive at evacuation hospitals within 12 hours.

FIRST AID INSTRUCTIONS

The following instructions relative to emergency care of eye casualties are given all doctors in combat units to insure safe transportation of these casualties to the rear.

1. All cases of eye injuries should be evacuated promptly to the nearest ophthalmologist as absolute litter patients with both eyes patched.

2. In cases of seventh-nerve paralysis, when the patient cannot close his eyes, the eyelids should be sutured together to prevent exposure keratitis and possible subsequent corneal ulcer.

3. Prior to evacuation, 300,000 units of penicillin should be administered intramuscularly, and 1.0 gm. of sulfadiazine should be given four times daily, each dosage of the latter to be accompanied by 10 gr. of soda bicarbonate by mouth. Local instillation of penicillin, 5,000 units per cc., and 30-percent sodium sulfacetimide, two drops to the involved eye four times daily, is recommended local medication. Sodium sulfacetimide ointment (10 percent) may be substituted for the stronger solution. The use of terramycin ointment, 5.0 mg. per gm., or aureomycin ointment, 1.0 mg. per gm., is recommended as antibiotic substitute for local penicillin therapy in cases that exhibit penicillin sensitivity.

4. Cases of anterior or posterior uveitis should receive 1.0-percent atropine locally prior to evacuation. In any case in which return to duty is anticipated within three

weeks, the use of 4.0-percent homatropine or 0.25-percent scopolamine solution locally for mydriasis instead of 1.0-percent atropine is recommended.

5. Patients with corneal ulcers and corneal foreign bodies should receive the mydriatics just mentioned locally, local antibiotics and sulfonamides, and the eye should be patched.

6. In purulent eye infections, such as endophthalmitis or panophthalmitis, mydriatics locally should be given. Penicillin and sulfadiazine should be administered systemically, while antibiotics and sodium sulfacetamide should be instilled locally. The eye will be more comfortable if left unpatched.

7. Patients with intraocular foreign bodies or penetrating wounds of the eye should receive mydriatics, antibiotics, and sodium sulfacetamide locally, and penicillin and sulfadiazine systemically. Both eyes should be patched.

8. The taking of X-ray films to localize intraocular or orbital foreign bodies is a precise procedure, requiring special equipment and technique. It should be deferred until arrival of patient at the installation where removal is to be accomplished. Attempting such localizations under field conditions is considered a waste of time and X-ray film.

9. Patients with suspected retinal detachment or commotio retinae should receive mydriatics to the involved eye and should be made absolute bed patients with both eyes patched, both prior to and during evacuation. A massive vitreous hemorrhage may mask these two conditions, hence, should be managed in the same manner.

10. Patients exhibiting fresh blood in the anterior chamber should receive neither mydriatic nor miotic and should be evacuated as absolute litter patients with the head raised approximately 30 degrees. This will permit gravitation of blood inferiorly, in an effort to prevent blood staining of the central area of the cornea.

11. In cases of severe thermal burns of the eyes, a bland ointment, such as boric acid,

will give relief and suffice for the evacuation period. If the burns of the lids are severe and the patient must be retained for any reason, suturing the eyelids together may aid to prevent cicatricial ectropion and subsequent lagophthalmos. Chemical burns should receive copious irrigations of water or normal saline at once to remove the chemical mechanically, and the eye should be dilated in severe cases. If available, warmed and well-shaken 5.0-percent Hydrosulphosol in castor oil instilled in the conjunctival sac after local 1.0-percent pontocaine anesthesia may be of value in cases of chemical burns of the eyes, after irrigation has been performed. A pressure bandage should be applied over the involved eye when this drug is used.

12. More extensive repair of ocular injuries should not be attempted by medical officers not having specialized training in ophthalmic surgery.

TYPES OF OCULAR INJURIES

I shall now consider the more prevalent types of ocular injuries encountered during this period. Figures quoted are from the Tokyo Army Hospital; however, they are fairly representative, as approximately 70 percent of all eye cases within the Far East Command were referred to this installation. It must be realized that wounded men pass through several medical installations en route to their final destination, so one patient may appear separately upon the statistical report of several hospitals.

RETAINED INTRAOCULAR FOREIGN BODIES

Of the 216 such cases received, removal was attempted in 174. Foreign bodies were successfully removed in 129 cases, 104 of these foreign bodies being magnetic and 25 nonmagnetic.

The Lancaster hand magnet was of tremendous value, its chief merit being that it may be switched on and off rapidly, permitting controlled movement of the foreign body to the desired position within the globe.

Experience taught us that foreign bodies lodged anywhere in the vitreous could be removed easiest and with least damage to the eye through a meridional incision through the sclera and pars plana. Attempts at removing such foreign bodies via the anterior route provoked marked hemorrhage.

Naturally, foreign bodies lodged within the anterior chamber were removed anteriorly through a corneal section, preferably through the original wound of entry if it were still open. Foreign bodies embedded in the iris often required excision of a small amount of iris along with the foreign body, and hemorrhage was frequent.

Foreign bodies embedded within the lens substance were generally left alone, removal being deferred until extraction of the traumatic cataract was performed. Foreign bodies embedded in the retina, however, were found to be best removed directly through a scleral incision over the site of the foreign body. Such removal was followed by surface diathermy applications around the site of removal to prevent subsequent retinal separation.

The Berman locator was of great value in localizing both magnetic and nonmagnetic bodies, and many of the latter could not have been successfully removed without its help. It was noted that the pure copper and light metal alloys used by the enemy elicited no response with either the magnet or the locator.

Although an excellent giant magnet was available, its use was considered essential in only seven cases of very small retained bodies, which were faintly magnetic, in the center of the vitreous chamber. The giant magnet was useful in delivering the body to the periphery of the eyeball, where the hand magnet could then be used to control delivery through an opening previously made in the pars plana.

X-ray localizations of foreign bodies by the modified Sweet method were of greatest value in determining whether a body was intraocular or extraocular but, as this method

is based upon standard eye measurements, localizations by this method were often inaccurate in semicollapsed eyes.

Generally, no attempt was made to remove small nonmagnetic foreign bodies from within the eye, as attempts at finding the body caused more damage than did the original foreign body.

Time was found to be of utmost importance in foreign body removal; those cases in which the intraocular foreign body was removed within 24 hours after injury did much better than those which were not cared for until several days later. In our experience, foreign bodies within the vitreous chamber produce organization of vitreous after 24 hours, and removal becomes more difficult, with a greater chance of intraocular hemorrhage.

Although many of these cases were evacuated to the United States and their follow-up was difficult, it was interesting to note that six patients, who were returned to duty in Japan after removal of intraocular magnetic foreign bodies, returned to this hospital several months later exhibiting what appeared clinically to be siderosis bulbi.

Several cases of glass and plexiglass in the anterior chamber were received. Removal by grasping the material by forceps and bringing it through limbal incisions was generally successful.

EXTRAOCULAR FOREIGN BODIES

These fall into four categories: corneal, scleral, orbital, and adnexal.

Corneal foreign bodies were common, especially in cases of land-mine explosions; 188 such cases were received at Tokyo Army Hospital. Painstaking removal under direct magnification, using binocular loupe and Universal-type slitlamp, produced best results, although some very deep foreign bodies of the cornea stubbornly refused to be removed and were left alone.

Sclera. In several cases of suspected intraocular foreign bodies, at operation the foreign body was found to be embedded in the

sclera without penetration, or embedded in one of the extraocular muscles. The Berman locator was very valuable in the 24 such cases received at Tokyo Army Hospital.

Orbital foreign bodies were removed if easily accessible, generally by hand magnet. However, in many instances the body was behind the eyeball, close to the venae vorticosae or the optic nerve. In such cases, the body was left in the orbit, especially if vision was not impaired. In 106 of the 252 orbital foreign-body cases received at Tokyo Army Hospital, the body was removed.

Adnexal. One hundred nineteen cases with foreign bodies lodged in the brows and lids were received. These were usually removed by hand magnet with little difficulty.

PENETRATING WOUNDS OF THE EYEBALL

These cases were rather common and most often were due to shell-fragment or rifle-bullet wounds. Naturally, if the eye was shattered or fragmented, with prolapse of considerable uveal tissue, or otherwise hopelessly lost, that eye was enucleated immediately as a prophylactic measure against sympathetic ophthalmitis. Fortunately, we have had no such cases of this dread complication to date.

In the 225 enucleations performed at Tokyo Army Hospital, 98 buried movable implants and 105 plastic ball implants were used. In 22 cases, it was not possible to place an implant until further plastic repair was performed. There were five cases of bilateral enucleation.

All enucleation cases were evacuated immediately; hence, we had no opportunity to follow the prosthetic results or range of motion. Needless to say, the necessity of enucleation was carefully explained to each patient, and any questions he might have were answered prior to enucleation.

If there were any chance of saving the eye, regardless of vision at the time of surgical examination, the wounds were closed and the patient watched carefully for sympathetic ophthalmitis occurring in either eye. A spe-

cial effort to repair almost hopelessly lost eyes was made in cases of binocular injuries; otherwise, I am sure the patients would not have felt satisfied.

In cases of perforating wounds of the eyeball it was noted that posterior scleral perforations generally tended to close spontaneously. The orbital fat, Tenon's capsule, and the extraocular muscles acted as splints to effect wound closure of the sclera.

Penetrating wounds of the anterior sclera were closed satisfactorily, using interrupted 3-0 plain catgut sutures. Extensive penetrating corneal wounds were approximated by interrupted 6-0, black-silk sutures, with conjunctival flaps placed over the sutured wounds. A conjunctival flap alone was found to suffice in cases of smaller penetrating corneal wounds.

LID WOUNDS

Patients with complete penetrating wounds of the lids regained good function if repair and approximation of anatomic layers were accomplished early—within 36 hours after injury. When a longer period elapsed between injury and repair, functional results were found to be poorer.

Plastic repair of large traumatic colobomas was not attempted; such patients were evacuated immediately to a plastic-surgery center in the United States. Likewise, contaminated wounds of the lids and adnexa were not closed until the wound became clean.

Wounds of the lower eyelids near the inner canthus, severing the inferior canaliculus, presented the problem of restoring the canaliculus. This was accomplished in 17 cases by inserting wire through the inferior punctum, through the canaliculus on both sides of the incised wound, and into the lacrimal sac, closing the wound around this wire and leaving the wire in place for 10 days. This resulted in a patent inferior canaliculus in 12 of the 17 cases.

CONTUSIONS

Blows to the eye were common. Contusions in themselves were not serious; how-

ever, a complication seen frequently was commotio retinae with macular hole. Most cases of commotio retinae responded to absolute bedrest, dilating the eyes, and patching both eyes initially, substituting pinhole glasses later.

Retinal detachments occurred with contusions as well as with foreign bodies. Most of them were detachments or disinsertions of the inferior retina, probably because of the reflex elevation of the eyes when struck.

In 42 cases of traumatic detached retina repair was made by electrocoagulation.

Tears were often multiple. Choroidal tears were seen frequently. They often responded to bedrest with the eyes occluded. A few cases of iridodialysis were seen but in most the injury was too small to warrant attempted repair.

Subluxated lenses were generally not removed in Japan; patients were evacuated to the United States for this procedure. No cases of secondary glaucoma associated with subluxated lenses were encountered.

TRAUMATIC CATARACTS

Cataracts frequently followed cases of intraocular foreign bodies and penetrating wounds of the globe involving the lens. In general these were not sufficiently mature for safe extraction prior to evacuation to the United States; however, a few were removed successfully by the combined extracapsular method.

BURNS

Many enemy prisoners-of-war who had received napalm burns of the face and of the entire body were treated. In other cases, fires and exploding gasoline stoves produced burns of the face.

The blink reflex is so rapid that it was common to receive a patient with severe burns of the face with a white band of unburned skin surrounding the palpebral fissure and with the eyes spared. Such cases offered no problem to the ophthalmologist. Others, however, less fortunate had seared

corneas. These usually improved by patching and dilating the pupil. In severe cases that developed ectropion, split-thickness skin grafts reduced the ectropion.

Chemical burns were generally due to battery acid or lime. These patients had received copious irrigations of water, normal saline, or whatever was available at the first medical installation. Treatment at a general hospital was usually directed toward making the patient comfortable. About 85 cases of severe burns of the eyes and adnexa were received at Tokyo Army Hospital.

At present Hydrosulphosol is available and is being evaluated in the treatment of eye burns at forward installations, as well as in other hospitals.

Several cases of phosphorous burns of the cornea were received. They were generally due to premature explosion of flares. These were treated the same as other corneal burns. In a few instances, phosphorus penetrated the cornea to produce burns of the iris. In two cases, tattoo-like corneal opacities resulted. These burn cases were generally old by the time they reached Tokyo, having received emergency treatment at forward installations.

COMBINED NEUROSURGICAL AND EYE CASUALTIES

Approximately 40 percent of all patients with head wounds have associated eye damage, hence it was realized quite early that an ophthalmologist must be assigned to or be immediately available to each neurosurgical team in Korea.

The 65-bed neurosurgical ward at Tokyo Army Hospital affords a splendid opportunity for correlating known head injuries with visual field changes. This is of special educational value to the young ophthalmologists assigned to this hospital.

Many cases of proven brain tumors are first seen in the eye clinic, the first symptoms being visual disturbances. When the finding of papilledema and significant visual field changes lead to referral to the neurosurgical

section, the ophthalmologist is able to observe the intracranial surgery.

ANESTHESIA

In traumatic surgery, when the patient was apprehensive and might have suffered multiple wounds of the body, we found that general anesthesia was far more satisfactory than local, and certainly was appreciated by the patient. Moreover, the staff of well-trained anesthetists in every Army Hospital makes general anesthesia a safe procedure even in the critically injured. Sodium pentothal administered intravenously was used almost exclusively in traumatic eye cases.

When local anesthesia was employed for minor procedures and for cataracts, the drugs of choice were 1.0-percent pontocaine for local instillation and 4.0-percent novocain for infiltration. The latter, we realized, was stronger than generally recommended, but in our experience lesser strength did not produce deep enough anesthesia and wore off too soon. We have never had a novocain reaction.

ANTIBIOTICS AND SULFONAMIDES

Antibiotics, systemically, included penicillin, 300,000 units daily; aureomycin, 250 mg., four times daily; streptomycin, 500 mg., twice daily; chloromycetin, 250 mg., four times daily, and terramycin, 250 mg., four times daily. No one of those agents seemed to have any distinct advantage over the others in prophylaxis of secondary infections.

Sulfadiazine, 4.0 gm., daily, was tolerated best among the orally administered sulfonamides.

Local antibiotics included penicillin solution, 5,000 units per cc., and ointment; aureomycin solution, 5.0 mg. per cc., and ointment; streptomycin and chloromycetin solutions, 5.0 mg. per cc., and terramycin solution, 5.0 mg. per cc., and ointment. Sodium sulfacetimide, 30-percent solution or 10-percent ointment, was the local sulfonamide of choice.

TETANUS TOXOID

Special reference to the importance of administration of tetanus toxoid for penetrating and perforating wounds of the eye is omitted since all battle casualties routinely receive a booster injection of tetanus toxoid on arrival at the first medical installation treating them.

ACTH AND CORTISONE

Both drugs were tried systemically to combat preoperative and postoperative infections in cases of intraocular foreign bodies and in endophthalmitis. No advantage was found over intravenous typhoid-fever therapy.

Cortone, topically and subconjunctivally, offered little help in ocular injuries, but was found to be of value in inflammatory diseases of the cornea and occasionally in anterior uveitis. Neither drug administered systemically or topically appeared to influence the course of posterior uveitis.

TRACHOMA

Very few cases of trachoma were found among American troops, but several cases were seen in other United Nations troops, principally Ethiopians. Many cases were discovered in an epidemic of conjunctivitis among Chinese prisoners-of-war on the island of Kojedo, necessitating a mass treatment program.

This was accomplished within the compounds by administering sulfadiazine and soda bicarbonate with water by mouth, plus an eye ointment (sodium sulfacetimide, aureomycin, terramycin, or penicillin) three times daily at meal times for a period of 10 days.

While this program was in progress, redistribution of prisoners from Kojedo took place; therefore, only about half (about 9,000) of the affected Chinese received the full course of therapy. However, a follow-up of the cases which had been treated indicated that the incidence of follicular conjunctivitis, including cases of clinical trachoma, de-

creased from an initial 40 percent to five percent. The program was being continued when this paper was written.

From hospital cases we found that aureomycin by mouth and locally applied in the eyes produced consistently better results than did sulfadiazine by mouth with the use of various eye ointments. Only a small amount of terramycin was available; in our hands, it appeared to be about equal to aureomycin in the treatment of this disease. It is anticipated that a more complete report of this treatment of trachoma among Chinese prisoners-of-war will appear at an early date.

DETERMINING VISUAL ACUITY

The importance of determining visual acuity at the time of admission of the patient, frequently during hospitalization, and at discharge or transfer, cannot be over-emphasized. In our hospital vision is taken every time a patient visits the clinic, generally daily. We often found that sudden loss of vision was the first clue that all was not well and further investigation was indicated.

As stated before, we found that prognosis as to retention of vision was inversely proportional to the time that had elapsed between injury and receiving definitive care. We have all been told at one time or another that there is no rush in treating an eye wound or that it is generally safe to wait until morning.

Granted the eye wound is not as acute an emergency as the severance of the femoral artery; however, where minutes are important in such cases, we found hours to be just as important in eye wounds. We learned that expert care rendered as soon as possible gave the soldiers who had received eye injuries the best chance of retaining or regaining useful vision.

MILITARY OPHTHALMIC PROBLEMS

In his address on "Military ophthalmology" at the 1951 meeting, the president of

the American Academy of Ophthalmology and Otolaryngology mentioned, among other shortcomings noted during World War II, the absence of a chief consultant in ophthalmology, waste of trained personnel, delays in performing refractions, refractions performed by untrained personnel, and delays in furnishing satisfactory replacement spectacles.

The Army was also criticized for huge and expensive mistakes, waste and carelessness, mostly through ignorance, resulting from improper care in packing, storing, and distributing the sharp tools of our profession.

Directing attention to these previously existing faults has been of great value in planning the ophthalmic service in the Far East Command. I would like to point out how some of these difficulties have been overcome and what the conditions are today.

MILITARY CONSULTANTS

The chief of ophthalmology, Walter Reed Army Hospital, Washington, D.C., now acts as consultant in our specialty to the Surgeon General of the Army. Similarly, for the past three years prior to my recent return to the United States, it has been my privilege to serve as a theater consultant and as ophthalmologist, Tokyo Army Hospital.

Frequent visits are made to every hospital in Japan and Korea to which an ophthalmologist is assigned, to give any assistance or advice he may require. These visits generally include a talk by the consultant to the professional staff of the hospital on an ophthalmic subject of general interest.

Any suggestions regarding the eye service are taken up with the ophthalmologist or commanding officer of the hospital at the time of the visit, rather than having recommendations in writing from higher headquarters at a later date. The coöperation and support of hospital commanders is essential. In my experience, every recommendation made pertaining to treatment policies, supplies, and assignment of personnel has been followed.

ASSIGNMENT

Ophthalmologists arriving in the Far East serve at Tokyo Army Hospital for approximately two months in order that they may become oriented to policies of the theater. This also permits an evaluation of their abilities. From this pool they are assigned to hospitals in Japan and Korea as vacancies exist.

With the splendid cooperation of personnel officers, we have been able to keep our ophthalmologists practicing their specialty. Whenever the need for an ophthalmologist ceases at one hospital he is transferred elsewhere so that he can be kept busy in his specialty. The same is true of optometrists.

REPLACEMENT OF SPECTACLES

An ophthalmologist and a commissioned or enlisted optometrist are assigned to almost every named Army, numbered General, U. S. Army, and Evacuation hospital. The only exceptions are when such hospitals are so close to one another that a service at each would result in a duplication of effort. In addition, enlisted registered optometrists provide refraction facilities at some Mobile Army Surgical Hospitals near the front lines.

Early in the conflict it was realized that facilities for dispensing spectacles must be decentralized if a delay in replacement was to be avoided. Therefore, a smaller optical shop is established in most hospitals, if an optical unit is not located nearby. One or more opticians are in charge and prescriptions can be filled from stock lenses. An opti-

cal technician is also stationed in each Mobile Army Surgical Hospital, and provided with edging machine, necessary tools, frames, and a stock of most commonly dispensed lenses. This generally results in a combat soldier receiving his replacement spectacles the same day loss or damage is reported if he carries his prescription on his immunization register.

Recently, more careful attention to physical profile serials has resulted in assignment of personnel with high refractive errors to noncombat units, so fewer combat personnel are now incapacitated by loss of spectacles.

SUPPLIES

Both standard and nonstandard supplies, including ophthalmic sulfonamides and assorted antibiotics, have been furnished promptly and in sufficient quantity through the energetic efforts of our medical supply officers. Surgical instruments are retained in the original manufacturer's packages, are well packed, and arrive in very serviceable condition. Sharp instruments are turned over to the ophthalmologist to care for personally.

CONCLUSION

The necessity for prompt definitive care of ocular injuries is reemphasized. Most failures and poor results occur in cases in which there was a delay in getting the patient to an ophthalmologist. The policy of placing a high evacuation priority on cases of eye injuries continues to give our wounded soldiers the best chance of retaining or regaining useful vision.

Letterman Army Hospital.

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THE EFFECT ON THE OCULAR BACTERIAL FLORA OF LOCAL TREATMENT WITH CHLOROMYCETIN (CHLORAMPHENICOL), TERRAMYCIN OR PENICILLIN-STREPTOMYCIN OPHTHALMIC OINTMENTS IN PREOPERATIVE CATARACT CASES AND MISCELLANEOUS INFECTIONS*

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Previous studies² on the value of preoperative cultures in cataract cases, indicated that *Staphylococcus aureus* is usually the etiologic agent responsible for postoperative infections. It has not been possible, utilizing all the known criteria for recognizing pathogenic staphylococci to foretell such infections.

Postoperative infections following cataract extraction occurred in about two percent of the eyes carrying presumably pathogenic staphylococci. It was also noted that prolonged treatment with penicillin and sulfonamide ophthalmic ointments prior to the operation, proved effective in eliminating staphylococci and reducing postoperative infections.

Although there is extensive literature concerning antibiotic therapy in infections in ophthalmology,^{1,2,8,10} the purpose of the present investigation was to select an agent which could be used preoperatively to sterilize the noninfected eye promptly. Chloromycetin, terramycin, and penicillin-streptomycin ophthalmic ointments were tested in preoperative cataract patients and also in a small group with miscellaneous ocular infections.

EXPERIMENTAL PROCEDURES

One group of patients consisted of preoperative cataract cases which were admitted a day or more before the scheduled operation. The eyes were first examined externally to determine any evidence of infection in the conjunctivas, lids, and lacrimal sac. Cultures of each eye were then taken as previously described.³

These patients were treated either with

1.0-percent chloromycetin, 0.5-percent terramycin, or with an ointment containing 1,000 units of penicillin G potassium and 20 mg. of streptomycin sulfate in each gm.[†] The antibiotics were applied locally in the conjunctiva and on the margins of the lids every two hours. Five to six such applications were administered in the first 24 hours.

In addition to the pretreatment culture, two others were obtained, one early the first morning and the other just previous to the operation. In some cataract cases in which presumably pathogenic organisms were found, the operation was postponed. These patients were treated further for two to four days. The eyes of these patients were cultured each day.

In order to eliminate false negative cultures due to minute traces of the antibiotics carried onto the culture plate from the conjunctivas or lids, the following technique was employed. The eyes were carefully irrigated with sterile saline solution, then the conjunctivas and lids were cleansed several times with a sterile cotton swab moistened in one-percent glucose infusion broth. This method was repeated until any possible trace of antibiotics was eliminated.

The eye cultures give an approximate measure of the degree of contamination of the conjunctivas and lids. Bacterial colonies may be so numerous as to be confluent or so sparse that only one or two may be found. Post-

[†] Chloromycetin for this study was kindly furnished by Parke, Davis and Company; terramycin by Chas. Pfizer and Company, and penicillin-streptomycin by Abbott Laboratories.

Chloromycetin base: Jelene 50W consisting essentially of saturated hydrocarbons.* Terramycin base: Petrolatum base. Penicillin-streptomycin base: 10-percent mineral oil with 90-percent petrolatum.

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operative infections can occur even when only a few organisms have been recovered.

A second group of patients consisted of ambulatory subjects with various ocular infections. They were first treated in the laboratory with one of the two antibiotic preparations and instructed in the technique of applying the agent for themselves. They returned home to carry out their own treatment, and came back for follow-up cultures after 24, 48, 72, and 96 hours.

After the isolation of organisms from the conjunctiva and lids, the staphylococci, *Proteus vulgaris* and coliform bacilli were tested for their sensitivity to the antibiotics employed in this study. The medicated-disc method was used.⁹ It consists of the application to freshly seeded blood plates of discs or tablets containing varying amounts of the test antibiotic. After 18 to 24 hours' incubation the plates were examined for zones of inhibition which indicate the degree of sensitivity.

RESULTS

The effectiveness of the antibiotics studied are indicated in Tables 1 and 2. As seen from Table 1, in a series of 56 preoperative patients in whom a variety of bacteria were isolated from the conjunctivas and lids, treatment with 1.0-percent chloromycetin ophthalmic ointment produced no appreciable inhibition in the ocular bacterial flora in 24 hours.

In eight of these cases in which *Staphylococcus aureus* and *Staphylococcus albus* were found preoperatively, the operation was delayed from 48 to 96 hours for further treatment which resulted in no decrease in the number of the organisms.

The data on the activity of 0.5-percent terramycin ophthalmic ointment in 57 cataract patients are also presented in Table 1. No decrease in bacteria was noted in 37 cases treated for 24 hours only; 20 showed some inhibition in number of organisms in this period of time. In five of these cases in which presumably pathogenic *Staphylococcus au-*

reus was present, the operation was delayed for supplementary treatment and after four days the eyes were free of bacteria.

The combination of penicillin-streptomycin ophthalmic ointment was tested in a series of 147 cataract patients. It may be seen from Table 1 that the effect of this combination on the ocular bacterial flora was more pronounced than that already described as following therapy with 1.0-percent chloromycetin, and 0.5-percent terramycin ophthalmic ointments.

It was evident that local treatment with this combination of antibiotics always produced some decrease in the number of bacteria even in 24 hours and often completely inhibited *Staphylococcus aureus* and even *Proteus vulgaris* as well as coliform bacilli and *Hemophilus influenzae*.

Of these 147 patients with a mixture of bacteria present in the conjunctivas and lids, 95 were almost completely free of organisms and 50 had no growth of bacteria after 24 hours of local therapy. In 12 patients who showed considerable decrease in number of organisms after 24 hours, the operation was delayed for further treatment. There was a complete elimination of bacteria in six of these patients in 48 hours and in the remaining six after 72 hours.

The response of a variety of ocular infections to local therapy with 1.0-percent chloromycetin or penicillin-streptomycin ophthalmic ointments is reported in Table 2. The local therapy in these groups was extended from 24 to 96 hours. Most of these patients had had infection for a long period of time.

Seventeen miscellaneous cases were treated with 1.0-percent chloromycetin ophthalmic ointment. In two patients with corneal ulcers and one with acute conjunctivitis, all due to *Staphylococcus aureus*, the infection was cleared in 72 hours. A newborn infant with membranous conjunctivitis due to *Streptococcus hemolyticus* showed no bacteria when subsequently cultured after 48 hours of treatment. Thirteen patients with various ocular

TABLE 1

THE EFFECT ON OCULAR BACTERIAL FLORA OF LOCAL PREOPERATIVE TREATMENT WITH CHLOROMYCETIN (CHLORAMPHENICOL), TERRAMYCIN AND PENICILLIN-STREPTOMYCIN OPHTHALMIC OINTMENTS IN 260 CATARACT CASES*

Preoperative Cultures Organisms Isolated	Number of Cases	Antibiotic Used	24 Hours' Treatment on Number of Bacteria Cultivated			
			No Decrease	Slight to Moderate Decrease	Almost Complete Inhibition of Growth	Complete Inhibition of Growth
Staphylococcus aureus	24	Chloromycetin	22	2		
Staphylococcus albus	53	Terramycin	33	20		
Diphtheroids	65	Penicil-Streptomycin		1	49	15
Staphylococcus albus						
Micrococci	27	Chloromycetin	25	2		
Sarcina						
Diphtheroids	59	Penicil-Streptomycin			32	27
Proteus vulgaris	5	Chloromycetin	5			
Coliform bacilli						
Staphylococcus aureus	4	Terramycin	4			
Staphylococcus albus	21	Penicil-Streptomycin		1	14	6
Hemophilus influenzae						
Staphylococcus aureus	2	Penicil-Streptomycin				2
Staphylococcus albus						

* 56 cases were treated with 1.0-percent chloromycetin(chloramphenicol)

57 cases were treated with 0.5-percent terramycin.

147 cases were treated with a combination of penicillin-streptomycin.

TABLE 2

THE EFFECT ON OCULAR BACTERIAL FLORA OF LOCAL TREATMENT WITH 1.0-PERCENT CHLOROMYCETIN (CHLORAMPHENICOL) AND PENICILLIN-STREPTOMYCIN OPHTHALMIC OINTMENTS IN 57 CASES WITH VARIOUS OCULAR INFECTIONS*

Diagnosis	Pretreatment Cultures Organisms Isolated	Number of Cases	Antibiotic Used	24 Hours' Treat- ment (moderate decrease)	Effect of Prolonged Treatment on Number of Bacteria					
					No Change in Ocular Flora			Complete Inhibition in Ocular Flora		
					(hours)			(hours)		
					48	72	96	48	72	96
Corneal ulcer	Staphylococcus aureus	2	Chloromycetin Penicillin- Streptomycin	1					2	
		3		2				2	1	
Acute conjunc- tivitis	Staphylococcus aureus	1	Chloromycetin						1	
Membranous conjunctivitis	Streptococcus hemolyticus	1		2				1		
Blepharoconjunctivitis	Staphylococcus aureus Staphylococcus albus Pneumococcus Diphtheroids	13	Chloromycetin		13	13	13			
Chronic conjunctivitis										
Chalazion										
Dacryocystitis		35	Penicillin- Streptomycin	14				14	17	4
Vernal conjunctivitis										
Blepharoconjunctivitis	Escherichia coli Staphylococcus albus	2	Penicillin- Streptomycin						1	1

* 17 cases treated with 1.0-percent chloromycetin (chloramphenicol).

40 cases treated with penicillin-streptomycin.

TABLE 3

SENSITIVITY IN VITRO TO FOUR ANTIBIOTICS OF STAPHYLOCOCCI, *PROTEUS VULGARIS* AND COLIFORM BACILLI ISOLATED FROM THE EYES OF THE PATIENTS IN THIS SERIES

Organisms	Number of Strains	Percent of Organism Sensitive to Each Antibiotic*			
		Penicillin	Streptomycin	Terramycin	Chloromycetin
Staphylococci	317	23	55	64	66
<i>Proteus vulgaris</i>	14	0	85	0	0
Coliform bacilli	18	0	33	0	0

* An organism was considered sensitive when the zone of inhibition produced by the test agent was as wide or wider than the standard established for sensitivity according to the chart supplied by the Commercial Solvents Corporation.

chronic infections caused by a variety of organisms showed no change in the ocular bacterial flora even after 96 hours of therapy.

The activity of penicillin-streptomycin ophthalmic ointment used in 40 ocular infections was better. Local therapy with penicillin-streptomycin appeared to be adequate to free the conjunctivas and lids of bacteria within 96 hours in all cases.

Strains of the staphylococci, *Proteus vulgaris* and coliform organisms isolated from the eyes were tested for their sensitivity in vitro to the four antibiotics. Table 3 presents the results of the tests. It may be seen that only 23 percent of the staphylococci were sensitive to penicillin; 55 percent to streptomycin; 64 percent to terramycin and 66 percent to chloromycetin. Of the *Proteus vulgaris*, 85 percent, and 33 percent of the coliform bacilli, were sensitive to streptomycin. All of these organisms were resistant to the other antibiotics.

DISCUSSION

The data reported here indicate that a combination penicillin and streptomycin ophthalmic ointment applied locally to the eyes markedly reduced the number of bacteria after one day of treatment. Some eyes became entirely free of organisms in 24 hours, and the few cases treated for 48 or 72 hours had no organisms at the end of therapy.

It already has been reported³ that treatment with penicillin for several days will eliminate bacteria from the eyes in the ma-

jority of cases treated. It has also been shown that such intensive treatment has greatly reduced the incidence of postoperative infections following cataract extractions. However, the search for other antibiotics to use for preoperative treatment of cataract cases, as well as for the therapy of long-standing miscellaneous ocular infections is stimulated by three unfavorable aspects of penicillin therapy.

The first of these is that the incidence of penicillin-resistant strains of staphylococci is increasing. While, among 815 strains of staphylococci isolated from the eyes between 1944 and 1946, only 11 percent were penicillin resistant, the number of such resistant strains has been steadily increasing so that 77 percent of the strains reported here were resistant. This experience is similar to that reported by other investigators.^{4, 7}

The second problem is that penicillin usually takes several days to eliminate completely the organisms from the eyes.³ This, of course, increases the hospital days required per patient.

Finally, penicillin does not have as broad a spectrum of activity as the more recently discovered antibiotics and is inadequate for treating the gram-negative bacilli, namely *Proteus vulgaris* and coliform bacilli. The combination of penicillin and streptomycin has apparently solved all three of these problems.

It may be seen from Table 3 that, on the basis of the in vitro tests, either chloromycete-

tin or terramycin might be expected to give more effective results than the penicillin and streptomycin. The in vivo results, however, were clearly in favor of the penicillin-streptomycin combination. These two antibiotics are considered synergistic,⁶ as well as bactericidal, which may in part account for the good results obtained.

It may be pointed out that local treatment offers a great advantage in that very large amounts of the antibiotics may be applied. Test-tube tests measure sensitivity in terms of micrograms of antibiotic but local application of these agents permits exposing the bacteria to milligrams rather than to micrograms of the active agent.

One interesting point is that, in this relatively small group of patients treated with the antibiotics employed in this investigation, no allergic reactions were encountered.

SUMMARY AND CONCLUSION

1. Chloromycetin ophthalmic ointment did not significantly decrease the ocular bacterial flora in preoperative cataract cases. It was effective in four acute ocular infections but

failed in 13 cases with chronic ocular infections.

2. Terramycin ophthalmic ointment decreased the number of bacteria in 20 of 57 cataract cases in 24 hours. In five patients treated for 96 hours, the organisms were completely eliminated.

3. A combination of penicillin and streptomycin in ophthalmic ointment eliminated bacteria from the eyes of 147 cataract cases in 24 to 72 hours. It was equally effective therapeutically in a limited group of 40 infections of the eye.

4. A combination of penicillin and streptomycin in ophthalmic ointments can be used as a practical sterilizing agent for the eyes in preoperative cataract cases and in acute and chronic infections.

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BACTERIAL SENSITIVITY TESTS IN THE TREATMENT OF CHRONIC EXTERNAL OCULAR INFECTIONS*

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In spite of the widespread use of the sulfonamides and antibiotics, chronic external ocular infections are still an annoying problem for the ophthalmologist. In this study a series of such infections was treated with the drug indicated by cultures and tests of the sensitivity of the pathogenic organisms to various antibiotics. The results in this group were compared with those in a series of infections treated by usual empiric choice of drug.

BACTERIAL RESISTANCE TO ANTIBIOTICS

Bacteria may react to chemotherapeutic agents in four ways¹: Suppression, the desired result; habituation or acquired resistance; dependence of the bacteria on the agent for life, a laboratory phenomenon; and stimulation of the bacteria.

Habituation or acquired resistance was first noticed with the sulfonamides, when it was proven that clinically resistant disease was due to strains of gonococcus which were resistant *in vitro*.² Less commonly strains of pneumococci³ and hemolytic streptococci⁴ resistant to the sulfonamides have been found. The mechanism of the resistance is the production by the bacteria of a sulfonamide inhibitor,⁵ which has been proven in certain cases at least to be para-amino benzoic acid. Once acquired, this resistance is permanent.

In the case of penicillin it has been frequently reported of late⁶ that staphylococci have a marked tendency to acquire resistance

to the drug. This is of particular importance in ophthalmology since the *Staphylococcus aureus* is the most common cause of external ocular infections. Many clinical failures with penicillin can be attributed to this phenomenon, as the resistant strains become prevalent by selection and are just as invasive and as toxic as the sensitive strains.⁷

In ophthalmology it has been reported that, in the Boston area, 30 percent of the strains of staphylococci were penicillin resistant.⁸ In the present study, 48 percent of the pathogenic staphylococci were resistant to penicillin.

Resistance to penicillin in other species of bacteria has been mainly a laboratory phenomenon.¹ However, at least two cases have been reported of a streptococcus becoming increasingly resistant during treatment with penicillin.¹

All species can become highly resistant to streptomycin in as short a period as one day, both *in vitro* and *in vivo*.⁹ Eighty-five percent of *B. aerogenes* from urinary-tract infections have been found to be streptomycin resistant, and it is postulated from this and similar findings that soon all the bacteria in the world will be streptomycin resistant.¹

The tubercle bacillus, due to its slow growth, develops resistance much less rapidly, and this resistance is still further slowed by para-amino salicylic acid.¹ *B. proteus* and *Pseudomonas aeruginosa*,¹⁰ as well as other organisms,¹¹ acquire resistance to neomycin as speedily as they do to streptomycin.

In vivo resistance of bacteria to aureomycin has been reported by many authors,⁶ as has resistance to chloramphenicol,^{1,6} and to terramycin.¹² Development of resistance to one of these drugs has been shown to carry with it concomitant resistance to the others.¹² The resistance to these drugs is moderate

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and not necessarily permanent.

Stimulation of bacteria, both resistant and sensitive strains, by nonlethal doses of penicillin has been noted in a number of clinical¹³ and laboratory reports.¹ Most commonly, gram-negative organisms such as *E. coli*, *B. aerogenes*, and *Pseudomonas aeruginosa* have been stimulated to replace the gram-positive flora of the mouth or region studied, but the *Staphylococcus aureus* has also been stimulated.¹

This phenomenon has been noted in ophthalmology, Leopold and LaMotte reporting that proteus organisms grew more rapidly in the conjunctival sac in the presence of penicillin.¹⁴

DETERMINATION IN VITRO OF THE SENSITIVITY OF BACTERIA TO ANTIBIOTICS

Many writers have suggested that the treatment of infections should be guided by bacteriologic diagnosis and sensitivity studies, both in general medicine and surgery and in ophthalmology.^{15, 16} Several methods of determining the sensitivity of bacteria in vitro to chemotherapeutic agents and antibiotics are available. They fall into two groups, dilution methods and diffusion methods.¹⁷

In the dilution methods, the bacteria are inoculated on liquid or solid media containing various strengths of the agent to be tested. Usually the lowest concentration which shows no visible growth is taken as the minimum inhibitory concentration. More exactly, the tubes or plates may be later subcultured to determine the exact concentration at which the bacteria were completely destroyed, a lower but parallel minimum inhibitory concentration then being determined. These methods are exact, but painstaking and expensive. They are commonly used for research work.

In the diffusion methods,¹⁷ the organisms are grown on an agar plate and a quantity of the antibacterial agent to be tested is placed on the surface of the plate in a depot which may be a glass or metal cup, a hole

in the agar, or, as described first by Morley,¹⁸ in a small saturated filter-paper disc.

As the antibacterial substance diffuses out into the culture media, a concentration gradient is set up and the growth of the organism is inhibited (if sensitive) in a circular area about the depot wherever the drug is present in sufficient concentration. Measuring the diameter of this zone of inhibition gives a measure of the sensitivity of the organism to the drug. These are widely used methods in clinical practice as they are both rapid and inexpensive.

The filter-paper disc diffusion method as described by Bondi and Dietz¹⁹ was used in this study.

Several discussions of sensitivity tests have appeared in the recent literature.^{19, 20} All investigators agree that the filter-paper disc diffusion method is reliable for testing the sensitivity of one organism to one antibiotic.

It is also desirable to choose the best or most effective antibiotic from among several tested. The majority of investigators^{19, 20, 21} conclude that here also this test is of sufficient accuracy for clinical purposes, especially in strains of bacteria resistant to empirical therapy,²² the antibiotic being chosen on a basis of difference in zone size. However, Patrick and others²¹ and Jackson and Finland²² advise caution with such comparisons. They state that only the sensitivity or resistance of a single organism to a single drug can be reported from these tests.

The diffusion tests for bacterial sensitivity can be used with the soluble sulfonamides but negative results are not reliable, due to the fact that all the usual laboratory media contain sulfonamide inhibitors. Therefore, the organisms in this series were not tested with the sulfonamides, although clinically sodium sulfacetimide and gantrisin are useful drugs in gram-positive infections.

THE STUDY

A group of 175 unselected patients with chronic external ocular infections were ex-

amed and treated. These infections fell into four categories: chronic conjunctivitis, chronic blepharitis, chronic blepharoconjunctivitis, and chronic conjunctivitis associated with infection of the lacrimal passages.

A careful clinical examination was performed, and only cases in which chronic infection was considered to play a major role were considered in this series, thus eliminating, for example, some cases of chronic irritation due to exposure with no infective element.

A conjunctival smear was examined and, if eosinophils were found, the case was treated as being probably of allergic origin and eliminated from the series. Certain other cases were considered probably allergic on the basis of history and clinical findings.

Seborrhea, if present, was treated concurrently. Surgical measures were used concurrently with the antibiotic therapy in chronic dacryocystitis.

A platinum loop was flamed and rubbed over the conjunctiva and eyelid margins, and then used to inoculate a tube of broth and a blood-agar plate. The broth and plate were then incubated over night. The following day the organisms were identified.

Staphylococci were tested for ability to coagulate human serum,²⁴ and to ferment mannitol.²⁵ The necessary identification tests were done on all organisms.

If a pathogen was cultured it was inoculated evenly over the surface of a blood-agar plate.

Filter-paper discs, 10 mm. in diameter, were dipped in various strengths of the several antibiotics, shaken once, and then laid on the surface of the plate, according to the method described by Bondi and Dietz.¹⁹

At the same time a control plate was prepared by inoculating it with an organism known to be sensitive to the antibiotics used in testing, and placing on it the filter paper discs dipped in antibiotic as described. These plates were then incubated over night.

The next day, the zone of inhibition

around the various discs was measured with calipers and reported in millimeters, along with the bacteriologic diagnosis.

Bondi and Dietz suggested inoculating the specimen directly onto a blood-agar plate and placing the discs for sensitivity testing directly on the first plate. This would cut in half the time necessary to determine the sensitivities, as they could be read 24 hours later, at the same time that the organism was identified. This is not possible in the case of cultures from chronic external ocular infections, as in most cases too few colonies of bacteria appear on the first plate to exhibit readable zones of inhibition.

Meanwhile, the patient had been given instructions as to the general care of the external disease, treatment of associated seborrhea, removal of crusts from the eyelid margins, application of hot packs, and so forth. In most cases, an antibiotic selected on a basis of the clinical appearance was prescribed for interim use. The patient was asked to report back on completion of the bacteriologic study.

After the bacteriologic study was completed, the indicated antibiotic was prescribed. All cases in which a gram-negative organism was reported were recultured. If the second culture failed to show the same gram-negative organism, it was classified as a contaminant, and the case was eliminated from the group showing positive cultures unless another pathogen was found. In some of the cases with a negative culture, a second attempt was made to find the pathogenic organism.

The concentration of penicillin used on the filter-paper discs was chosen so that a moderate-sized zone of inhibition (20 mm. to 25 mm.) would correspond to a penicillin minimum inhibitory concentration of 0.1 μ /cc. by the tube-dilution test. Therefore, a sensitive organism would show a fairly large and easily measurable zone of inhibition. This is also the concentration of penicillin which can with certainty be presumed to be maintained in the conjunctival sac and

TABLE 1
PERCENTAGES OF STANDARD SOLUTIONS AS USED IN EXTERNAL EYE

Drug	Standard Solutions	Standard Ointment	Strengths of Test Solutions*	
Penicillin	1,000 μ /cc.	10,000 μ /gm.	1.0 μ	10 μ
Streptomycin	10,000 μ /cc.	10,000 μ /gm.	10 μ	100 μ
Neomycin	10,000 μ g./cc.	5,000 μ g./gm.	10 μ g.	100 μ g.
Aureomycin	500 μ g./cc.	1,000 μ g./gm.	5.0 μ g.	50 μ g.
Terramycin	500 μ g./cc.	1,000 μ g./gm.	5.0 μ g.	50 μ g.
Bacitracin	200 μ /cc.	500 μ /gm.	10 μ	100 μ
Chloramphenicol	250 μ g./cc.	1,000 μ g./gm.	25 μ g.	250 μ g.

* With chloromycetin and bacitracin, this proportion had to be raised to give moderate-sized zones to sensitive organisms.

the other tissues concerned in chronic external ocular infections.²⁸ The moderate-sized zones corresponding to this sensitivity are, with the 1.0 μ /cc. test disc, 15 to 25 mm.; with the 10 μ /cc. disc, 20 to 30 mm.

Similar percentages of the standard solutions used for treatment of external eye diseases were used for other drugs, a method similar to that of Douvas and other¹⁶ (table 1).

RESULTS

BACTERIOLOGY OF CHRONIC EXTRAOCULAR INFECTIONS

One or more pathogenic organisms were

isolated from 73 percent of the cultures. The staphylococci grown were considered pathogenic if they proliferated a pigment, coagulated blood serum, or fermented mannitol.

As a control of the technique, cultures were taken from 66 preoperative cataract patients who were free from clinical signs of extraocular infection. All of these cultures grew a nonhemolytic *Staphylococcus albus* and 10 also grew diphtheroids. These organisms were considered to be nonpathogens.

The pathogenic organisms isolated from the chronic external ocular infections, and the potentially pathogenic organisms isolated

TABLE 2
PATHOGENIC ORGANISMS ISOLATED

	Totals	Chronic Conjunct.	Chronic Blepharitis	Chronic Blepharo- Conjunct.	Chronic Dacryocystitis (adult)	Chronic Dacryocystitis (child.)	Normal Conjunctivas (control group)
Total Cases Cultured		64	32	51	17	10	66
Hemolytic Staph. aur. Cg + Mn +	20	4	2	13	1		
Nonhem. Staph. aur. Cg + or Mn +	44	15	13	11	2	3	
Hemolytic Staph. alb. Cg + or Mn +	4	1	1	1	1		
Nonhem. Staph. alb. Cg + or Mn +	15	3	7	2	2	1	
Hemolytic Staph. alb. Cg - & Mn -	5	2		1	1		
Total pathogenic Staph.	88	25	23	29	7	4	7
Streptococcus hemolyticus	5	3	2				3
Streptococcus nonhemolyticus	13	8		4	1		
Streptococcus viridans	6	1		1	1	3	
Pneumococcus	9	1			1	7	
Micrococcus catarrhalis							1
E. coli	4	1		1	2		1
B. proteus	9	4	1	1	2	1	
Pseudomonas aeruginosa	11	4			7		1
Aerobacter aerogenes	1				1		
Total cases gram negative rods	21	9	1	2	12	11	2

from the normal conjunctivas are tabulated in Table 2.

CHRONIC CONJUNCTIVITIS

Sixty-four cases of chronic or recurrent conjunctivitis were studied. A total of 47 organisms were isolated, the most frequent being the group of pathogenic staphylococci, one of which was the offending organism in 25 cases. The streptococci, as a group, were next most frequent.

In nine cases, or 22 percent of chronic conjunctivitis cases, a gram-negative rod was cultured. Table 3 summarizes the results of treatment of those cases which we were able to follow. On the left side are the cases in which the organism was identified, and the condition treated on a basis of sensitivity tests.

The other cases are those which were treated in an exactly similar manner; that is, after a clinical decision that they were due to infection, a culture was taken but a pathogenic organism was not obtained. These cases were then treated empirically with the antibiotic of choice against the organism which, on a clinical basis, would seem to be the cause of the condition; all adjuvant treatment given the positive cases was also used.

Of those patients in whom a positive culture was obtained, 27 reported themselves (or were seen to be) cured; five were unimproved. Of those in whom a negative culture

was obtained five were cured, eight were unimproved.

Of the three types of chronic external disease studied, the lowest percentage of positive cultures was obtained in this group, and also the lowest percentage of cures (table 3).

CHRONIC DACRYOCYSTITIS

Follow-up reports were obtained from 21 of the 26 patients with positive cultures and all but three were cured. The one patient in whom no pathogenic organism was grown still has her symptoms of tearing and recurrent purulent conjunctivitis. Almost all of the patients in this group had surgical procedures in conjunction with antibiotic therapy. These cases may be divided into two groups.

In 16 cases of chronic dacryocystitis in adults, 75 percent were found to have a gram-negative rod as one of the causative organisms. These patients had one to three probings and one to several irrigations. Major surgery included incision and drainage of a lacrimal-sac abscess with later excision of the sac (two cases), and dacryocystorhinostomy (four cases). I am definitely of the opinion that culture and sensitivity tests reduced the incidence of major tear apparatus surgery in these cases, and that the patients were relieved of their symptoms with or without major surgery much faster.

TABLE 3
RESULTS OF TREATMENT

	Positive Culture				Negative Culture				Total Cases	% Positive Culture
	Cured	Not Cured	No Follow Up	Total	Cured	Not Cured	No Follow Up	Total		
Chronic or recurrent conjunctivitis	27	5	8	40	6	10	8	24	64	62.4
Chronic blepharitis	18	2	6	26	3	4		7	33	79.0
Chronic conjunctivitis asso. with blepharitis	28	3	5	36	3	10	2	15	51	70.1
Chronic dacryocystitis	18	4	4	26		1		1	27	96.5
TOTALS	91	14		128	12	25		47	175	

TABLE 4
SENSITIVITY OF PATHOGENS TO VARIOUS ANTIBIOTICS

Organism	Number of Strains	Penicillin	Aureomycin	Terramycin	Bacitracin	Chloromycetin	Streptomycin	Neomycin
Staph. aureus cg or mann+	Resistant Tested	23 48	2 25	7 69	12 72	9 72	11 40	
Hem. Staph. alb.	Resistant Tested	3 7	1 8	1 11	3 10	3 9	0 3	
Streptococcus hem. nonhem. & virid.	Resistant Tested	8 20	0 7	2 20	3 24	3 24	4 11	
Diplococcus pneumoniae	Resistant Tested	1 9	1 4	0 8	1 8	0 6	0 2	
Proteus vulgaris	Resistant Tested	6 6	3 3	7 8	1 1	4 7	4 6	0 2
Escherichia coli	Resistant Tested	0 1	1 3	1 4	1 1	2 4	0 3	
Pseudomonas aeruginosa	Resistant Tested	8 8	6 6	7 8	3 3	9 9	7 9	1 1
Aerobacter aerogenes	Resistant Tested	1 1	0 1	0 1		1 1	0 1	0 1

In children with chronic dacryocystitis, one tear-duct probing and treatment with the antibiotic indicated in sensitivity tests cured the condition in every case but one. A pneumococcus was isolated in seven out of 10 cases. In children, only one gram-negative rod was found, a *B. proteus*.

In cases of chronic dacryocystitis almost 100-percent positive cultures were obtained and over 90-percent cures.

CHRONIC BLEPHARITIS

Eighty-four cases of chronic blepharitis were studied. Positive cultures were obtained in 26 cases of chronic infection of the eyelid margins without much conjunctival involvement, and in 36 cases with clinical conjunctival involvement. In 22 cases, a pathogen was not cultured. Together, these make up about half of the cases in the series.

Pathogenic staphylococci were the organisms isolated in 85 percent of these cases. A few cases of each type were caused by streptococci; and gram-negative rods were cultured from a total of three cases.

Careful instruction in treatment of associated seborrhea undoubtedly played a part

in the number of cures obtained in this condition. It can be seen from Table 3 that 49 out of 53 patients in whom a positive culture was obtained reported (or were seen to have) cures, while of those in whom no pathogen was isolated five out of 19 were cured by similar treatment.

SENSITIVITY OF THE PATHOGENS TO DIFFERENT ANTIBIOTICS

Table 4 shows the instances of resistance found in this study. The criteria for resistance of an organism to an antibiotic was either incomplete inhibition or no inhibition with the lesser strength disc and less than 15-mm. zone of inhibition with the greater.

Each of the antibiotics tested was found to be the drug of choice in certain cases, and was found not to affect the organism in others. Penicillin, of course, had more organisms resistant to it than any other drug. For this reason, and also because of the increasing incidence of allergy to the drug,¹⁸ it was eliminated from consideration in most of the last 75 cases.

THE GRAM-NEGATIVE RODS

Gram-negative rods were found in 22 per-

cent of positive cultures in chronic conjunctivitis cases, five percent of positive cultures in chronic blepharitis cases, and 75 percent of adult cases of chronic dacryocystitis. This is a much higher incidence than in any other reported series.

All of these patients had had previous, prolonged treatment with an antibiotic or antibacterial agent, usually one effective only against the gram-positive group of organisms such as penicillin or bacitracin. The empiric use of these agents doubtless resulted either in the stimulation of the gram-negative organisms, or at least produced a more fertile field for their growth.^{1, 14}

These organisms are notoriously variable in their reactions to the antibiotics.²⁷ As an illustration, in this series, four *E. coli* organisms were isolated. One of these was sensitive only to chloromycetin; two were insensitive only to chloromycetin of the drugs tested; and the other was most sensitive to chloromycetin but quite sensitive to all the wide-spectrum antibiotics.

Of the 11 strains of *Pseudomonas aeruginosa* isolated, two were not inhibited at all by any of the antibiotics tried, which unfortunately did not include polymyxin. Only one strain was well inhibited by any drug (streptomycin). The others showed feeble inhibition with chloromycetin, streptomycin, neomycin, or terramycin.

Of the nine strains of *B. proteus* isolated, one was well inhibited by any drug. Two were fairly well, and three slightly, inhibited by streptomycin and neomycin; others were slightly inhibited by chloromycetin or terramycin.

The one strain of *aerobacter aerogenes* was quite sensitive to terramycin and streptomycin.

THE STAPHYLOCOCCI

The staphylococci are by far the most important organism in the causation of external ocular infections. They were present in 84 percent of the positive cultures in cases of chronic conjunctivitis, 85 percent of

chronic blepharitis, 50 percent of chronic dacryocystitis.

They are next to the gram-negative rods in their variability in reaction to the antibiotics. Forty-eight percent of the pigment-producing, coagulase- or mannitol-positive organisms were resistant to penicillin.

Some were resistant to each of the other antibiotics tested so that, if any of these were used exclusively without sensitivity tests, some cases of resistant organisms would be treated. This percentage would be least with aureomycin and terramycin but it may be that, as these drugs come into more common use, the incidence of organisms resistant to them will show an increase.

THE PNEUMOCOCCI

The pneumococci were generally sensitive to all of the antibiotics tried. This consistency is in agreement with other workers.²⁸ They were the most important causative organism in the cases of chronic dacryocystitis in children. In this disease, therefore, empirical therapy with penicillin, bacitracin, terramycin, or aureomycin should result in a high percentage of cures.

THE STREPTOCOCCI

The streptococci also have been found by other workers to be constant in their sensitivity to the antibiotics.²⁹ This was not found to be the case in chronic external ocular infections. Instances of resistance were found to each of the antibiotics except aureomycin (and this drug was used least often in testing), although they were generally found less often than with the staphylococci.

CONCLUSIONS

1. Staphylococci are the commonest bacterial cause of chronic external ocular infections. Forty-eight percent of the staphylococci in this series were resistant to penicillin, and instances of resistance to aureomycin, terramycin, bacitracin, chloromycetin, and streptomycin were numerous.

2. Chronic external ocular infections often show mixed bacteriology.

3. Gram-negative rods were found in a significant percentage of all types of chronic extraocular infections (75 percent of chronic dacryocystitis in adults). This increasing incidence may be due to indiscriminate empirical use of antibiotics and antibacterial agents. Gram-negative rods vary widely in their sensitivity to antibiotics.

4. Routine culture and determination of the sensitivity of the causative organism to the antibiotics is a practical means of improving the results of treatment, of chronic external ocular infections.

These procedures are important in chronic dacryocystitis in adults because of the high

incidence of gram-negative organisms; and in chronic blepharitis and conjunctivitis due to infection because the causative organism in 83 percent of cases is the staphylococcus which is very variable in its sensitivity to antibiotics.

These procedures may not be necessary in chronic dacryocystitis in children where the commonest infecting organism is the pneumococcus which is quite regular in its sensitivity.

5. The filter-paper disc technique of sensitivity testing is rapid and inexpensive. It is of sufficient accuracy to be a reliable guide in the clinical management of chronic external ocular infections.

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THE ETIOLOGY OF ACUTE GLAUCOMA

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The term "primary glaucoma" is employed to designate syndromes which show in common an increase in the intraocular pressure. In addition to this, a number of other symptoms occur which may be derived in a more or less direct manner from the pressure increase. As our knowledge of the disease develops, we may hope to differentiate one class after another from this etiologically ill-defined group and to establish uniform subgroups.

The clinical picture in primary glaucoma is not uniform and it has long been the practice to distinguish between acute and simple glaucoma.

Acute glaucoma is characterized in typical cases by, initially, short prodromal attacks with pressure rise, slight injection of the ocular vessels, and clouded vision due to edema of the cornea. Between the attacks the eye remains, for a time, normal. Ultimately, however, a severe acute attack occurs which more or less completely extinguishes the vision, or the disease passes into a chronic

state with continual hypernormal pressure, dilatation of the ocular vessels, and eventual amaurosis.

In simple glaucoma, on the other hand, no dilatation of the ocular vessels appears in the earlier stages. The disease is characterized by persistent, as a rule moderate, increase in pressure and the main objective symptom is excavation of the papilla with consequent functional deterioration. Only at a later stage may a certain vasodilatation also appear.

Apart from those clinically marked differences there are others, concerning which opinions are more divided. A symptom that has long attracted attention is the shallow anterior chamber. It is considered to occur mainly in acute glaucoma, while its presence in simple glaucoma is uncertain.

By the customary methods of clinical investigation it has been found impossible, despite great efforts, to make a closer analysis of the etiology of the disease. The discussion has become highly speculative and

has given rise to a number of theories.

In recent years, however, certain special methods of investigation have been developed which have permitted the elicitation of new facts possibly capable of shedding fresh light on the problem. I shall confine myself here to two of these methods, of especial interest with regard to acute glaucoma, namely measurement of the depth of the anterior chamber and gonioscopy.

Measurement of the depth of the anterior chamber has long presented difficulties and only recently have methods of sufficient accuracy been worked out. The movements of the eye during the measurement have previously made the results uncertain, but this source of error has been diminished by simultaneous focusing on the anterior surface of the cornea and the anterior surface of the lens. This requirement is satisfied by the apparatus of Lindstedt^{8,9} (1913) and the measurement is, by this method, performed in the optic axis of the eye.

The significance of the depth of the anterior chamber is, however, rendered difficult to appraise by the circumstance that considerable variations occur, both individual and with age. Only when these can be allowed for, will it be possible to arrive at definite conclusions.

In a paper published in 1931,⁸ I compared the chamber depths of 100 glaucomatous eyes with those of 810 normal eyes. By applying certain calculated correction factors for different age groups, the reduction with increasing age of the chamber depth has been allowed for. After such correction, all the values may be considered to derive from eyes of one and the same age group, namely 70 years.

For the 100 glaucomatous eyes, a mean value for the chamber depth of 2.93 ± 0.050 mm. is obtained, while the corresponding value for the normal eyes is 3.15 ± 0.011 mm. There is thus a difference of 0.22 ± 0.051 mm. which is more than three times the standard error. The collected glaucoma material thus shows a significantly smaller

depth of chamber than that of the normal eyes.

A question of special interest, however, is whether this shallower chamber occurs in all cases or only in a certain number of glaucomatous eyes. In order to permit a decision on this point, a comparison has been made between the frequency curve for normal eyes and that for glaucomatous eyes.

If the shallow chamber is present in all glaucomatous eyes, the frequency curve does not change, but only becomes displaced. If, on the other hand, only certain glaucomatous eyes show an especially low depth of chamber, the frequency curve must alter.

It appears from Figures 1 and 2 that such an alteration actually occurs. Shallowness of the anterior chamber displayed by a glaucomatous material is hence due to the fact that a small group possess exceptionally shallow chambers while the majority have a chamber depth of about the same magnitude as normal eyes.

If, with the aid of the frequency curve (fig. 2), those cases which show an exceptionally shallow chamber in glaucoma are separated, their clinical pictures are found to have the character of acute glaucoma. In a few cases, however, simple glaucoma has been present.

A question which has also been investigated is whether the shallowness of the anterior chamber is brought about by the glaucomatous process or whether a shallow chamber is associated with a predisposition to glaucoma.

In the study of 48 cases of unilateral glaucoma, the depth of chamber in the healthy eye did not differ apparently from that in the glaucomatous eye in the same individual. Hence it may be concluded that the glaucomatous increase in pressure does not alter the depth of the chamber. The fact that so many cases of exceptionally shallow chamber are to be found in a glaucoma survey must, therefore, indicate that a shallow chamber is associated with a predisposition to the disease.

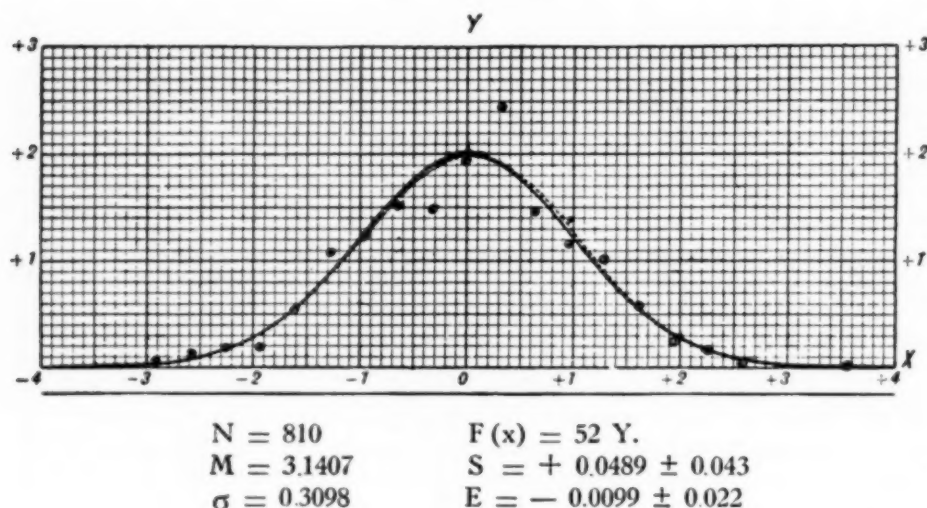


Fig. 1 (Rosengren). Frequency curve for the depth of the chamber of the normal eyes, calculated according to Charlier. (Rosengren,⁸ p. 140.)

Barkan¹ (1938) has arrived at a similar view by way of his microgonioscopic studies. He has been able to demonstrate a close correlation between the anatomic structure of the angle of the chamber and the clinical picture of the glaucoma. Acute glaucoma especially is associated with a narrow angle and simple glaucoma with a wide angle.

Barkan also states that cases appearing as simple glaucoma which, nevertheless, on

gonioscopic investigation, show a narrow angle of the chamber, are characterized by the fact that they may readily be converted to acute glaucoma by the action of glaucoma-inducing substances such as weak mydriatics.

The investigations of Barkan also show that the angle of the chamber appears to be especially narrow in the region of Schwalbe's ring, hence somewhat anterior to the angle proper. Here there is an especial tendency to synechia formation.

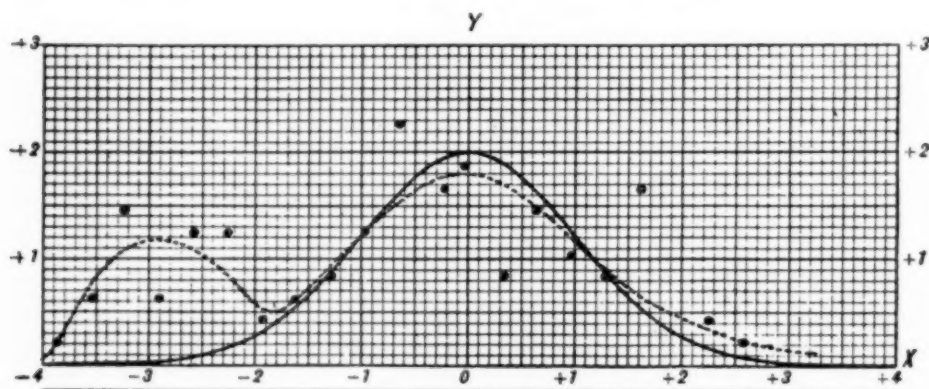


Fig. 2 (Rosengren). Fitted curve for the depth of the chamber of glaucomatous eyes. (Rosengren,⁸ p. 141.)

Kronfeld⁵ (1948), who has also made a detailed gonioscopic study, has similarly arrived at the conclusion that "the correlation between gonioscopically established narrowness of the angle entrance and the incidence of narrow-angle glaucoma is very close." He writes further: "The large majority of the eyes with narrow entrances to the angle developed manifestations of narrow-angle glaucoma during a five-year period of observation."

It is obvious that a disease so complicated and so difficult to assess as acute glaucoma may be interpreted in different ways. Thus, Duke-Elder,² in a very interesting review which has aroused much attention, has maintained that "the immediate (or local) cause of congestive glaucoma is edema of the globe due to uveal vascular congestion."

Duke-Elder continues: "This congestion particularly affects the ciliary region, and the consequent swelling and edema push forward the root of the iris, narrowing the angle of the anterior chamber until the iris may touch the cornea. If such a condition is marked, and persists, an acute, strangulating attack of glaucoma may ensue. . . . It is, of course, obvious that the narrower the angle of the anterior chamber, the sooner such a culmination will ensue; and if the angle is sufficiently wide no acute accident may happen."

As this interpretation of the relationship between a shallow chamber and the vascular congestion differs essentially from the observations just described, I should like to consider Duke-Elder's statements in further detail.

Duke-Elder's explanation of the etiology of acute glaucoma may be considered in two parts.

First, he maintains that the immediate cause of congestive glaucoma is edema of the globe arising from uveal vascular congestion. No evidence for this view is, however, presented.

The second part of the explanation is the analysis by which Duke-Elder arrives at the

conclusion that a narrow angle of the chamber has a certain significance: the narrower the angle is, the more readily does the pressure increase, if the angle is sufficiently wide, no symptoms appear.

Duke-Elder does not, however, attribute an essential importance to this factor: "narrowness of the angle is of importance, since it may bring about an acute crisis by strangulating the ocular circulation; but narrowness of the angle is not causal; it is merely an incident which may affect the course of the disease."

Thus, Duke-Elder does not regard a narrow angle of the chamber, but rather a vascular congestion, as the primary and principal cause of acute glaucoma. What is the basis of this hypothesis?

Congestive factors of two kinds may be conceived:

1. In every eye, as in other organs, small variations continually occur in the blood volume. If, however, such variations give rise to clinical symptoms only when the eye shows a structural peculiarity, a shallow chamber, it would seem that this peculiarity, and not the fluctuations in blood volume, constitutes the extraordinary factor.

2. It may be that certain eyes have a special disposition to congestion. Duke-Elder³ writes: "We may surmise that into the etiology there may enter, either singly, successively, or in combination, such factors as neurohumoral anomalies, an upset in the neurovegetative balance between the sympathetic and the parasympathetic systems, endocrine dyscrasias, or the multitude of factors, physical or psychosomatic, especially those endowed with emotional tone, which are integrated in the thalamus and hypothalamic region."

To this statement of Duke-Elder, it may be remarked that Priestly Smith,⁷ in his well-known work on glaucoma, also discussed congestion of the uveal tract as a "usual starting point of an acute primary glaucoma." He added, however: "But this explanation of the origin of acute glaucoma

is obviously incomplete. Feeble circulation, chill, mental strain, and so forth are common troubles; acute glaucoma is comparatively rare."

It may also be mentioned that Fuchs⁴ pointed out many years ago that myopic eyes, having a deep chamber, are apparently immune to acute glaucoma. Moreover, Duke-Elder, as already cited, has said, in agreement with this, that no clinical symptoms appear in cases with wide angle of the chamber.

Whether congestion occurs or not appears to depend, therefore, upon the structure of the eye. Thus, if one discounts the somewhat improbable explanation that such factors as neurohumoral anomalies, displaced neurovegetative balance, endocrine dyscrasia, and so forth are correlatable with certain anatomic peculiarities of the eye, one is forced to adopt the view that the structure of the eye is an essential factor in acute glaucoma.

The importance of this factor may be estimated by calculating the morbidity risk of acute glaucoma for different depths of chamber.

According to the investigations of Nelander,⁶ the glaucoma material cited corresponds to a population of about 100,000. Only 2.28 percent of these—that is, 2,280—

have a depth of chamber smaller than μ -2.07 (2.53 mm). Since the depth of chamber is not significantly altered by the disease, the morbidity risk may be approximately calculated.

Among the cases of acute glaucoma, 15 cases have a chamber depth below 2.53 mm. This implies that the morbidity risk of acute glaucoma for this depth of chamber is 15 out of 2,280—that is, 1:152. Of the remaining 97,720 cases, with a depth of the chamber more than 2.53 mm., only three became affected by acute glaucoma, that is, the morbidity risk is 1:32,573.

These figures suggest that the morbidity risk of acute glaucoma is appreciably greater when the chamber is shallow than when it is of normal depth. The limited extent of the material, however, does not permit the calculation of an exact figure. It would be desirable to obtain a precise statistical value by further investigation of a larger material. This would decide whether a primary uveal vascular congestion or the special structure of the eye is the main cause of the disease.

For the measurement of the depth of the chamber, an apparatus is now available, designed by Stenström¹⁰ on the principle of Lindstedt, with which reliable values may be obtained.

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THE PUPIL IN SYPHILIS

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In 1869, Argyll Robertson¹ presented a group of pupillary phenomena which he observed in neurosyphilis and which we now refer to as the Argyll Robertson pupil. If nothing else, this attracted the attention of physicians to the diagnostic importance of pupillary disturbances in syphilis of the brain. Much of his original treatise has been passed along through the years relatively unchallenged.

Argyll Robertson offered the following requisites for the phenomenon: (1) The retina is sensitive to light; (2) the pupil does not contract on exposure to light; (3) the pupil contracts during accommodation; (4) the pupil contracts further with eserine but dilates poorly with atropine; (5) the pupil is small.

There are numerous qualifications to the foregoing, such as the inequality of the pupils, the irregularity of the pupil, the presence of iris atrophy, and the requisite that the retina and optic nerve must be relatively intact.

A subject of considerable controversy has been the size of the pupil. Strictly speaking, the pupil must be small. A large pupil, which otherwise conforms to all other requisites, is considered by most clinicians today to represent an Argyll Robertson pupil. It may be true that the majority of these cases represent central nervous-system lues, but a significant portion are due to other causes.

If we are liberal in our definition, we will find this phenomenon not infrequently associated with encephalitis, multiple sclerosis, diabetes mellitus, neoplasms of the mid-brain, alcoholism, and even herpes zoster. A careful review of these latter cases reveals that the pupil conforms to all the requisites except for size. Miosis is rare in these conditions.

It seems possible to state that a small, irregular pupil, which does not react to light

but reacts to a near stimulus (see below), is almost certainly due to central nervous-system syphilis; if such a pupil is in a more mydriatic state, the cause may be syphilis. Until the mystery of the mechanism of this pupillary phenomenon is solved it would seem reasonable to assume disease processes other than syphilis may be present.

For a sign which has such great diagnostic importance, surprisingly little is known of the exact site of the disease process in Argyll Robertson pupil.

There are and have been many who consider the lesion to be peripheral. Early observers pointed to the third nerve and the ciliary ganglion. Although it is generally accepted that such lesions cause loss of the convergence-accommodation contraction and mydriasis, as well as immobility to light, there are many who have offered evidence that the third nerve and ciliary ganglion are the site of the pathologic process.

Ford, Walsh, and King² in studies of third-nerve regeneration found that: (1) The pupil might remain dilated and fixed to light; (2) it might not respond to direct light stimulation but contracts during adduction of the eye in conjugate lateral movements of the eyes; (3) the pupil might contract and show a sluggish reflex to light. (Note that the second group of findings might describe an Argyll Robertson pupil.) Bender and Fulton,³ as well as Ford, Walsh, and King, have already explained these phenomena as a misdirection of fibers during regeneration.

Another interesting speculation involves the ciliary ganglion. It is known that extirpation of the ciliary ganglion eliminates constriction of the pupil due to light but not that due to convergence.⁴ Nathan and Turner⁵ presented 10 cases with peripheral lesions in which this phenomenon was seen. Givner⁶ showed that episcleral ciliary ganglia exist

and this was thought to be the cause of the preservation of the convergence-accommodation response.

Langworthy and Ortega⁷ have theorized upon the role of the iris nerve supply. Such local changes in the iris as atrophy, depigmentation, and miosis together with the ptosis occasionally seen in tabes could be explained, according to these authors, by a lesion of the sympathetic fibers supplying the iris blood vessels, stroma, and pigment cells and the smooth muscle of the eyelids. The loss of tone of the sphincter muscle was explained by involvement of the sensory fibers of the iris.

Most observers today consider the site of the pathologic condition to be more central. The pretectal area is thought to be the region which shows the greatest vulnerability to a syphilitic infection. A popular theory is that of a chronic irritative process in the region of the constrictor center, although it would seem highly unlikely that an irritative process could go on for so many years. This theory would, of course, explain all the pupillary phenomena in terms of a spasticity.

Merritt and Moore⁸ made an interesting contribution. They considered that the sympathetic pathway must also be involved. It must be admitted that ptosis is occasionally seen in tabes and that the afferent fibers of the light reflex path and the pupillodilator pathway are near enough to each other so that a single lesion may involve both. They placed the lesion just lateral to the aqueduct of Sylvius, both crossed and uncrossed fibers to the oculomotor nuclei being involved.

There is evidence in favor of central and peripheral involvement. A central pathologic process appears more likely, although one is hard put to explain the local changes in the iris.

Argyll Robertson believed that pupillary constriction to near was normal, while Behr⁹ stated that the reaction to near was better than normal. However, it has come to the attention of many that this reaction is defective just as is the reaction to light.

Typically, the reaction to light fails while the reaction to near, although grossly disturbed, is not completely absent. In other words the light reaction is affected first followed by a diminution in the reaction to near.

An Argyll Robertson pupil does not occur overnight. It can be detected in its incipient stages. It may take months or years before the reaction is complete, although Schreiber¹⁰ observed the full reaction in eight days. By the time the pupil is immobile to light, the reaction to near is always badly damaged. Although this is not the currently accepted concept, many observers will agree with it. Most clinicians are satisfied if they observe any trace of a reaction to near in the presence of an immobile light response. Thus, the Argyll Robertson phenomenon may be qualified—reaction to near is better than the reaction to light.

The cause of the decreased reaction to near is probably the same as that for light. Involvement in the pretectal area causes damage to the afferent pupillary light fibers. However, the quadrigeminal ciliary pathway of convergence and accommodation originates very close to the site of predilection of syphilis. Consequently, it too will become involved as the process spreads.

This is borne out by the fact that the reaction to near is always affected more when the light response has become badly disturbed than it is in the earlier stages. As the destruction progresses, the reaction to near is finally entirely abolished.

A small, irregular pupil which is immobile to light and almost or totally unresponsive to near is more characteristic of neurosyphilis than that pupil which Argyll Robertson originally described. The disturbance of the reaction to near may have greater theoretical than practical importance, yet it gives a greater insight into the extent of the neurosyphilitic lesion.

Figure 1 shows the recordings (pupillographic tracing by Dr. Otto Lowenstein) in a 61-year-old luetic patient. The right pupil is the "typical" Argyll Robertson pupil. It

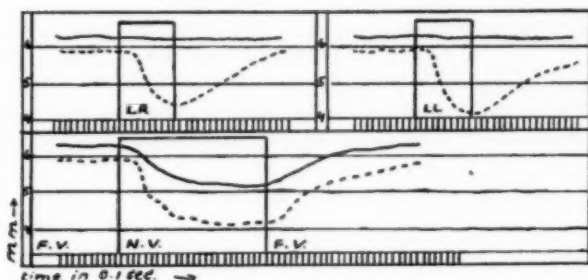


Fig. 1 (Jaffe). (Upper left) Light shown in O.D. (Upper right) Light in O.S. (Lower) Reaction to near. Solid line represents O.D., broken line represents O.S.

shows no reaction to light directly or consensually. The lower portion of the figure shows that the right pupil does contract on near vision but not normally, since this response is less than 50 percent of the response seen in the left eye.

Figure 2 shows a more advanced case. There is a faint response to light on both sides and the near reaction is likewise grossly impaired.

It is becoming increasingly evident that neurosyphilis, unlike cardiovascular lues, is not a late manifestation of the disease. In fact, invasion of the central nervous system occurs in nearly all patients during the early stages, usually during the first year. Pathologically, there is a leptomeningitis. Clinically, there are few or no symptoms.

This is not generally known since spinal

fluid examinations are rarely done early. It has been shown that spinal fluids are abnormal in nine percent of a series of patients with primary syphilis.¹¹ This work, done by Kopp, also showed that 16 to 48 percent show an abnormal fluid in early and late secondary lues. This is of practical importance since Kopp showed that these patients require more intensive therapy and observation.

Spinal-fluid findings indicate a strong tendency toward relapses. Parenchymatous neurosyphilis may develop in these patients despite what is commonly accepted as intensive and adequate therapy with mapharsen, bismuth, and/or penicillin.

Spinal-fluid examination must be repeated over a period of years. One cannot rely on one negative spinal-fluid test, especially just

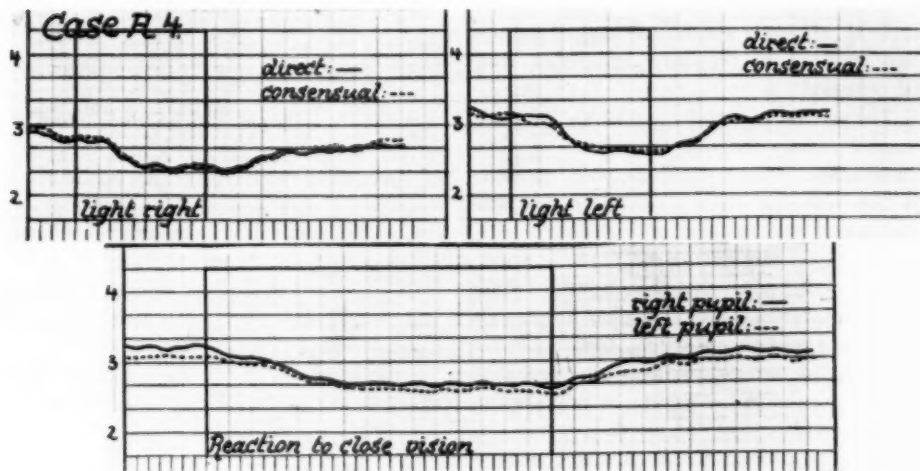


Fig. 2 (Jaffe). Parallel involvement. (See text.)

after chemotherapy. It should be repeated later.

Thus, if spinal-fluid changes are present relatively early (first two and one-half years after infection), additional chemotherapy is necessary. If marked improvement or a normal spinal fluid does not result within one year, Kopp recommends fever therapy. If the infection is of more than two years' duration when the patient is first seen and significant spinal-fluid abnormalities are present, fever therapy should be administered immediately, combined with penicillin.

It has been revealed that abnormality of the spinal fluid is not the only evidence of early syphilis of the brain. With the aid of pupillography, which is a photographic method of recording the reactions of the pupil, early diagnosis is possible.

Briefly, the method consists of having the patient seated in a chair in a darkroom. The source of illumination for photographic purposes is infrared light. A beam of light operated by a motor device flashes on one eye for one second and goes off for three seconds. A camera records the reactions of both pupils to the light stimulations.

Ten pictures are taken per second. Reactions to near, to psychosensory stimuli, and to drugs may be recorded similarly. By this method, a greatly magnified view of a reaction, such as the pupillary light reflex, may be obtained.

The science of pupillography has been advanced mainly through the efforts of Otto Lowenstein. The pupillographic patterns herein reported were all taken in his laboratory at the Institute of Ophthalmology, Presbyterian Hospital, New York.

It is well known that the pretectal region of the midbrain shows a peculiar vulnerability to a syphilitic infection. Destruction in this region causes marked alterations in pupillary reactions. This area is probably involved early in syphilis, yet the process is a slow one and the initial impairment remains invisible to the naked eye.

Little is known of the exact path of the

afferent pupillary light fibers from the point of exit of the fibers from the optic tract to the synapse in the Edinger-Westphal nucleus. From clinical observations and volumes of experimental data a hypothetical pattern has evolved.

It is reasonably certain that the fibers, after leaving the optic tract, form a synapse before they attain the oculomotor nerve nucleus. This synapse is thought by some to occur in the superior colliculus and by others to occur in the pretectal region closer to the third-nerve nuclei. At any rate, this second neuron is known as the intercalary neuron.

From the latter synapse, afferent fibers course to the ipsilateral and contralateral Edinger-Westphal nuclei. This is the basis of the consensual pupillary light reflex.

Figure 3 shows the hypothetical anatomy in the region of the pretectum. Such a pattern will account for the various bizarre

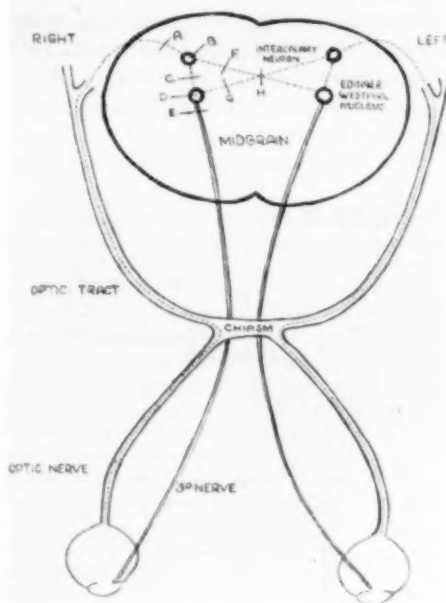


Fig. 3 (Jaffe). Diagrammatic sketch of the pupillary apparatus. The various possible lesions in neurosyphilis are shown. See text and Table 1 for explanation.

TABLE 1*
EFFECT OF LESIONS AT VARIOUS LOCATIONS IN
THE REGION OF THE PRETECTUM

Lesion	Right Direct	Right Consensual	Left Direct	Left Consensual
A	—	+	+	—
B	—	+	+	—
C	—	+	+	+
D	—	—	+	+
E	—	—	+	+
F	+	+	+	—
G	+	—	+	+
H	+	—	+	—

* See Figure 3.

— = Affected.

+ = Unaffected.

pupillary phenomena (table 1) seen in the earlier stages of parenchymatous neurosyphilis.

A lesion at A (before the fibers attain the first synapse) will block all impulses when light is flashed in the right eye. Thus the right direct and left consensual reactions are affected.

A lesion at B (at the first synapse) similarly blocks all activity when light is flashed in the right eye. Light flashed in the left eye will, of course, elicit normal responses.

A lesion at C (between the first synapse and the Edinger-Westphal nucleus) will only block the right direct reaction. The left consensual is normal since its path is undisturbed.

A lesion at D (in the Edinger-Westphal nucleus) abolishes all reactions on the right side regardless of which eye is stimulated.

A lesion at E (efferent fibers in the oculomotor nerve) similarly blocks all activity on the right side, no matter which eye is stimulated.

A lesion at F (between the first synapse and the contralateral pathway to the opposite Edinger-Westphal nucleus) abolishes only the left consensual response, that is, when light is flashed in the right eye.

A lesion at G (between the first synapse on the left and the contralateral Edinger-Westphal nucleus on the right) abolishes only the right consensual response.

A lesion at H (affecting both decussating pathways) blocks all consensual responses.

This is a small area with a complex anatomy. Many combinations of the above reactions may be found.

CASE REPORTS

The following cases, chosen at random from the New York City Hospital Venereal Clinic will serve to show the relatively early involvement of the brain in syphilis in spite of negative spinal serology and a paucity of symptoms.

CASE 1

D. M., a 44-year-old white woman, complained of very frequent dizzy spells and occasional headaches for the past month. She was aware of a luetic infection for less than one year. Neurologic and ophthalmologic examinations were normal.

Figure 4 shows that the pupils react normally and equally when light is shown in the right eye. Also, when light is shown constantly on the right eye, the pupils are equal in size and no anisocoria develops. However, when the left pupil is stimulated directly, the right one (consensual reaction) does not contract so much.

Even more striking is the anisocoria which results when the left eye is stimulated continuously with light. The consensual constrictor mechanism shows early impairment.

In this case the lesion is in the decussating fibers to the right side beyond the first synapse.

CASE 2

O. M. S., a 43-year-old white woman presented no complaints. Her luetic history dated back five years. Neurologic and ophthalmologic examinations were negative.

Figure 5 shows again that, when light is shown continuously in the left eye, an anisocoria results; whereas, it does not occur if light is shown continuously in the right eye. The lesion is identical with that seen in Case 1.

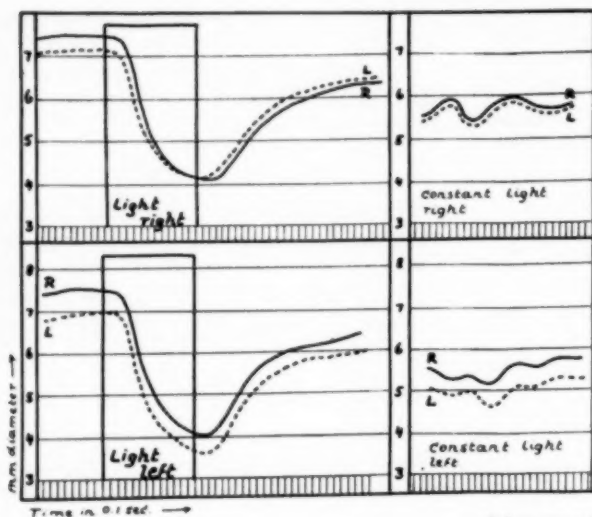


Fig. 4 (Jaffe). Graphic presentation of findings in Case 1.

tion for six months. Examinations of all systems were normal.

Figure 7 shows that, when light is shown in the right eye, both pupils contract equally, about 2.5 mm. However, when light is shown in the left eye both pupils contract 3.5 mm. This is similar to findings in optic atrophy. However, the right disc appeared normal, the visual field was normal, and

vision was 20/15.

The lesion here is in the right afferent pupillary pathway distal to the point where the pupillary fibers leave the optic tract. It may be in the synapse or just before it (points A or B in Figure 3).

These cases show some early changes which may occur in the pupillary light reflex in syphilis. None of these abnormal patterns were discernible with the naked eye. Pupillography gives added insight into the incipient stages of the Argyll Robertson pupil.

CASE 3

M. W., a 45-year-old Negress, complained of occasional dizziness. She had received antilutetic therapy several times during the past 10 years, but never a complete course. She had three spontaneous miscarriages. Neurologic and ophthalmologic examinations were normal.

Figure 6 shows that, when light is shown in the left eye, there is a perfectly equal contraction on both sides, that is, left direct response is equal to the right consensual. Also, continuous light produces no anisocoria. However, in the right eye, continuous light produces a definite anisocoria.

The lesion here is in the decussating fibers going from the first synapse on the right to the left Edinger-Westphal nucleus.

CASE 4

L. W., a 38-year-old Negress, had no complaints. She had been aware of her infec-

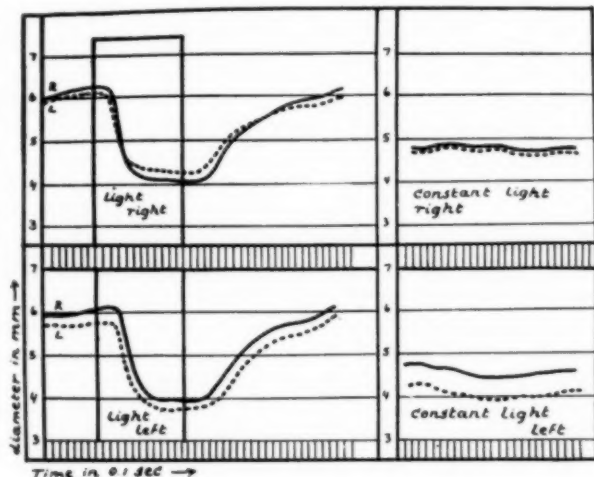


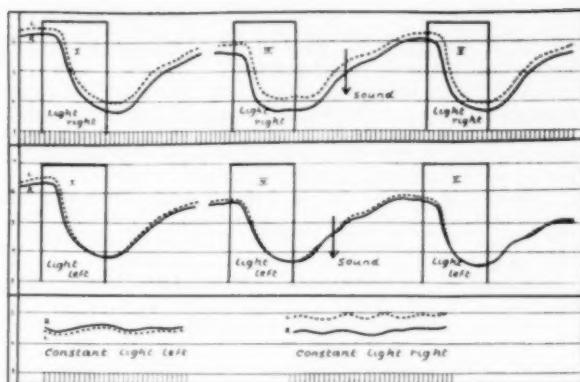
Fig. 5 (Jaffe). Graphic presentation of findings in Case 2.

Fig. 6 (Jaffe). Graphic presentation of findings in Case 3.

It is now realized that a legion of possible abnormal responses may be elicited depending on the exact site of the lesion.

The detection of early syphilitic invasion of the brain is of greatest importance. Crippling damage to vital functions may be prevented by such knowledge for there is increasing evidence today that some of the early damage in parenchymal neurosyphilis is reversible. This makes early detection especially urgent.

Walsh¹² saw the ability to react to light regained in two Argyll Robertson pupils in the eyes of different individuals following malaria therapy. Schreiber¹⁰ described similar cases. Lowenstein¹³ has also seen and reported such cases. Another case seen at New York City Hospital showed an immobile pupil to light on admission. There was a



slight, but definite reaction to near. After a course of intensive penicillin and fever therapy, the patient regained 50 percent of the normal contraction to light.

SUMMARY

1. The Argyll Robertson pupil is discussed.

2. In spite of its outstanding value as a diagnostic sign, little is known of the site of the pathologic disturbance responsible for the phenomenon. The current theories are discussed.

3. The reaction to near is also disturbed but this usually follows the damage to the light-constrictor mechanism. This has not been the generally accepted view.

4. Syphilis of the brain is not a late manifestation of the disease. Evidence is presented in support of this.

5. A hypothetical anatomic pattern is offered, one which will explain all the bizarre pupillary phenomena seen in neurosyphilis.

Four cases of syphilis with no other evidence of nervous system involvement are presented to demonstrate early alterations in the light reflex. These changes are invisible to the naked eye and are only seen by pupillography.

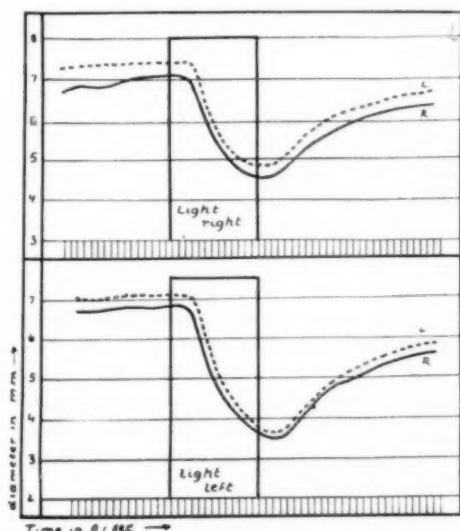


Fig. 7 (Jaffe). Graphic presentation of findings in Case 4.

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THE EFFECT OF AGE ON THE CARBONIC ANHYDRASE ACTIVITY OF BOVINE LENSES*

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The presence of a high concentration of carbonic anhydrase in normal bovine lenses was demonstrated by Bakker¹ in 1939. In senile cataractous lenses the carbonic anhydrase activity was found to be greatly reduced,^{1,2} this reduction correlating fairly closely with the degree of opacity of the lens. In several cases of mature senile cataract, no trace of the enzyme could be detected in the lens tissue. In the human also, Bakker found frequent absence of the enzyme from senile cataractous lenses.

How age affects noncataractous lenses with regard to their carbonic anhydrase ac-

tivity has not been investigated as yet. The present study was undertaken in an attempt to supply such information on the basis of carbonic anhydrase activity determinations of young, adult, and old bovine lenses.

PROCEDURE

Intact fresh cows' eyes were obtained from a slaughter house and kept refrigerated at 4°C. until examined within 10 hours of death; 11 eyes were from animals five months to one year of age, 10 from animals two to nine years of age, and 10 from animals 10 years or older.

Before removal of the lens, the cornea was washed with saline to insure absence of blood. The anterior chamber was then incised and the lens removed by intracapsular ex-

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The authors wish to thank Dr. John Esben Kirk for his guidance and inspiration.

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traction without permitting it to come in contact with the surface of the eye.

The lens was weighed immediately and placed in a Waring blender. Distilled water was added to make a tissue concentration of 1:1,000 and a fine homogenate of lens obtained by five minutes of blending. None of the lenses included in the study showed signs of opacity.

The carbonic anhydrase activity of the lens homogenates was determined by the method of Trethewie and Day³ as modified by Kirk and From Hansen.⁴ In this procedure the rate of hydration of carbon dioxide is measured colorimetrically.

Three ml. of bromthymol blue indicator in a sodium barbital/barbituric acid buffer of pH 7.9 were placed in a clean 10-ml. glass stoppered volumetric flask with a short neck. One ml. of distilled water and 1.0 ml. of lens homogenate were added.

After chilling this mixture to 0° to 0.5°C. in ice water, 5.0 ml. of distilled water saturated with carbon dioxide in a Dewar vessel at 0° to 0.5°C. was added quickly with a clean glass syringe and the time required to bring the pH from the original 7.9 to 6.3 was measured.

During the reaction the sample was kept immersed in ice water and was removed only at appropriate intervals to note the end-point, which was defined by comparing the color of the test sample with the color of a standard consisting of 7.0 ml. of a buffer solution of pH 6.3 and 3.0 ml. of bromthymol blue freshly mixed in a 10-ml. volumetric flask. This standard was kept in ice water with the test sample and removed with it for comparison.

Repeated determinations were made on all test samples in two dilutions—1.0 ml. of a 1:1,000 lens dilution representing 1.0 mg. of lens tissue and 1.0 ml. of a 1:2,000 lens dilution representing 0.5 mg. of lens tissue being used. Two blank determinations were done with each set of 10 samples.

Several samples tested with benzidine gave negative reactions. As observed previously,⁵

the enzyme was markedly inhibited by sulfanilamide in a 1:10,000 dilution.

Normal adult cows' blood (hematocrit 45) carbonic anhydrase activity was the standard used to compare the enzyme activity of the lens homogenates. The reaction time of various blood dilutions was graphed against the dilution. The enzyme activity of the lens homogenates could thus be expressed as the quantity of blood showing the same reaction time as the lens sample tested.

RESULTS

The results of the carbonic anhydrase activity determinations in the young, adult, and old bovine lenses are presented in Table 1. The average values obtained for the young, the adult, and the old lenses, expressed as the amount of normal adult cows' blood having the same activity as 1.0 mg. of lens tissue, were 0.27 ml., 0.23 ml., and 0.35 ml., respectively.

Statistical analysis of these figures showed no significance of the variation in the mean values representing the lens enzyme activity of the three age groups. The "t" value for the difference between the young and adult lenses was 0.57; between the young and the old, 0.80; and, between the adult and the old, 1.20.

This investigation, therefore, has failed to reveal any statistically significant effect of aging on the carbonic anhydrase activity of noncataractous bovine lenses. On the basis of the present findings it seems unlikely that a causal relationship exists between a low lenticular carbonic anhydrase activity and senile cataractous change. It seems more reasonable to assume that the decreased enzyme activity observed by Bakker in senile lenticular cataracts is a phenomenon occurring secondarily to the cataractous change.

SUMMARY

The carbonic anhydrase activity of homogenates prepared from noncataractous young, adult, and old bovine lenses was de-

TABLE 1
CARBONIC ANHYDRASE ACTIVITY OF BOVINE LENS TISSUE HOMOGENATES

Sample No.	Weight of Lens (mg.)	Lens Tissue in Test Sample (mg.)	Reaction Time (seconds)	Mg. Cows' Blood Equiv. to 1.0 mg. of Lens Tissue	Average
YOUNG LENSES					
1 a	1,059	1.0	27	0.30	0.26
1 b		0.5	40	0.22	
2 a	1,087	1.0	30	0.24	0.21
2 b		0.5	42	0.18	
3 a	1,139	1.0	23	0.41	0.36
3 b		0.5	36	0.30	
4 a	1,144	1.0	33	0.19	0.19
4 b		0.5	43	0.18	
5 a	1,532	1.0	27	0.30	0.30
5 b		0.5	36	0.30	
6 a	1,689	1.0	28	0.28	0.28
6 b		0.5	37	0.28	
7 a	1,820	1.0	32	0.20	0.19
7 b		0.5	42	0.18	
8 a	1,843	1.0	24	0.37	0.34
8 b		0.5	36	0.30	
9 a	1,850	1.0	25	0.34	0.32
9 b		0.5	36	0.30	
10 a	1,874	1.0	26	0.32	0.31
10 b		0.5	36	0.30	
11 a	1,905	1.0	29	0.25	0.25
11 b		0.5	40	0.24	
				MEAN	0.27
				S.D.	0.05
ADULT LENSES					
1 a	1,880	1.0	25	0.34	0.32
1 b		0.5	36	0.30	
2 a	1,930	1.0	29	0.25	0.22
2 b		0.5	42	0.18	
3 a	1,950	1.0	30	0.24	0.21
3 b		0.5	43	0.18	
4 a	2,013	1.0	29	0.25	0.23
4 b		0.5	41	0.20	
5 a	2,040	1.0	25	0.34	0.30
5 b		0.5	38	0.26	
6 a	2,160	1.0	35	0.16	0.14
6 b		0.5	47	0.22	
7 a	2,200	1.0	32	0.20	0.18
7 b		0.5	44	0.16	
8 a	2,321	1.0	31	0.22	0.20
8 b		0.5	43	0.18	
9 a	2,360	1.0	26	0.32	0.24
9 b		0.5	44	0.16	
10 a	2,371	1.0	29	0.25	0.22
10 b		0.5	43	0.18	
				MEAN	0.23
				S.D.	0.05
OLD LENSES					
1 a	2,190	1.0	25	0.34	0.30
1 b		0.5	39	0.26	
2 a	2,238	1.0	24	0.37	0.33
2 b		0.5	37	0.28	
3 a	2,339	1.0	17	0.64	0.47
3 b		0.5	36	0.30	

TABLE 1—(Continued)

Sample No.	Weight of of Lens (mg.)	Lens Tissue in Test Sample (mg.)	Reaction Time (seconds)	Mg. Cows' Blood Equiv. to 1.0 mg. of Lens Tissue	Average
4 a	2,393	1.0	32	0.20	0.17
b		0.5	45	0.14	
5 a	2,398	1.0	25	0.34	0.26
b		0.5	43	0.18	
6 a	2,416	1.0	20	0.52	0.46
b		0.5	32	0.40	
7 a	2,436	1.0	21	0.48	0.43
b		0.5	33	0.38	
8 a	2,442	1.0	22	0.44	0.36
b		0.5	37	0.28	
9 a	2,476	1.0	21	0.48	0.43
b		0.5	33	0.38	
10 a	2,490	1.0	28	0.28	0.27
b		0.5	38	0.26	
				MEAN	0.35
				S.D.	0.09

terminated using a modification of the colorimetric procedure of Trethewie and Day. The process of aging was not found to alter the

carbonic anhydrase activity of bovine lenses significantly.

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OPHTHALMIC MINIATURE

The first appearances of an eye affected by iritis is the faint pink blush that more or less fully encircles the cornea. . . . The form of the vascularity is zonular, not only from the aggregation of numerous red vessels that traverse the sclerotica at the fore part of the globe, before penetrating to the iris, but is made up of a series of straight vessels, all radiating towards the corneal junction, anastomosing but infrequently with each other, and hence easily distinguishable from the reticular form of conjunctival inflammation. It requires generally a good glass to distinguish any separate vessels, from their minuteness, and because they are but faintly seen through the tendinous aponeuronis of the muscles and the submucous tissue of the conjunctiva. The colour, therefore, at first is pink rather than red.

John Dalrymple, *Pathology of the Human Eye*, 1852

THE MACHEK OPERATION APPLIED TO THE LOWER LID FOR THE RELIEF OF SENILE ENTROPION*

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Machek's ingenious idea of affixing skin flaps from the upper lid to the frontalis muscle for the correction of ptosis was proposed in 1914. S. R. Gifford devised several technical improvements in 1932 and, thanks to his enthusiastic support, the Machek principle is now well known.¹

It is an excellent secondary procedure when some other method has proved inadequate; but where strong tension is needed the outcome may be disappointing as the elastic skin flaps lack the power of fascia lata, which is therefore preferable in primary interventions.

At a meeting of the Chicago Ophthalmological Society in 1947, James Wilson Clark presented a departure in the surgical correction of senile entropion. He everted the lower lid by a sling of fascia lata, the central portion inserted just below the middle of the lid margin and the diverging ends fixed to the periosteum of the orbital rim.

He reported five cases with recurrence in none. One of these patients who was recently seen after the lapse of six years confirmed the permanence of the good primary result.

In the discussion of Clark's paper, I suggested that his procedure could be simplified and possibly improved by substituting skin flaps for fascia as in the Machek method. Since only a slight downward pull is required to correct an entropion, the skin flaps serve adequately and their elastic property in this instance should be advantageous rather than otherwise.

In the intervening years various residents and I have done this lower lid Machek pro-

cedure in 12 cases with uniformly good results.

TECHNIQUE

The lower lid area is anesthetized with a procaine-adrenalin-hyaluronidase solution. Parallel to the lid margin and four mm. below, an incision line is made from each canthus leaving the central five mm. of skin intact. Below this line a second, but continuous, incision is cut, starting and ending two mm. within the first, to demarcate skin flaps six mm. wide at the ends, tapering to three mm. at the center (fig. 1).

The skin flaps are lifted and denuded of epithelium by trichloroacetic acid followed by light scraping, repeated twice. A double-armed suture of silk (3-0 U.S.P. size-British 0) on thin, slightly curved needles is matted through the raw surface at the end of each flap.

The flaps are temporarily turned down in a divergent position and at their limits small stab incisions are made through the skin.



Fig. 1 (Lebensohn). Lower-lid Machek operation; skin flaps outlined.

*From the Department of Ophthalmology, Northwestern University Medical School. Read before the Section on Ophthalmology, International College of Surgeons in September, 1952, at Chicago.



Fig. 2 (Lebensohn). The flaps with the epithelium denuded are drawn through prepared tunnels.

Using scissors or a double-edged blade, tunnels are prepared extending from the central attachment of the flaps to the stab incisions.

A grooved director is placed in each channel in turn, along which the needles are passed, blunt end first; and the flaps drawn through (fig. 2). The tunnels are now continued a short way below the stab incisions; the needles enter, catch the underlying tarso-orbital fascia, and exit through the skin. The sutures are tied over pearl or plastic buttons with only enough tension just to evert the lid border. Overcorrection is to be avoided.

After undermining slightly the borders of the gaping area below the lid edge, the skin is approximated by fine sutures. The stab incisions require no stitching (fig. 3). The postoperative occlusive dressing is removed in 24 hours, the stitches along the lid edge

in four days, and the tension sutures after eight to 10 days.

CASE REPORTS

Among the patients operated for senile entropion of the lower lids, two with the bilateral condition are presented because of certain instructive details.

The first patient (fig. 4) was 65 years of age and had had a bilateral Wheeler operation done in another town a year previously, but the entropion, trichiasis, and corneal irritation had recurred after a few months. A bilateral lower-lid Machek operation was done December 11, 1951, but with a somewhat different technique on the right and left eye.

The operation on the left lower lid was as described, but in the right lower lid a horizontal skin flap of four-mm. uniform width was cut in the center, forming two flaps attached at either end of the lid as in the Gifford-Machek operation. The lower photograph taken five weeks later demonstrates that both operations achieved an ex-



Fig. 3 (Lebensohn). Final sutures.

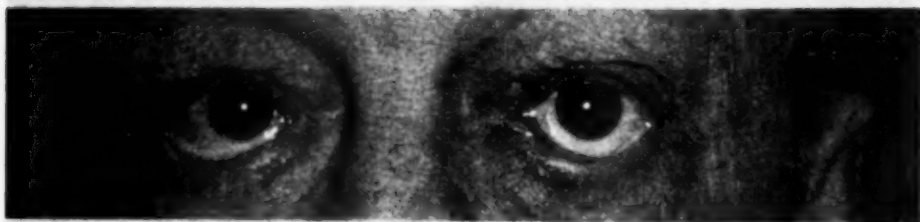
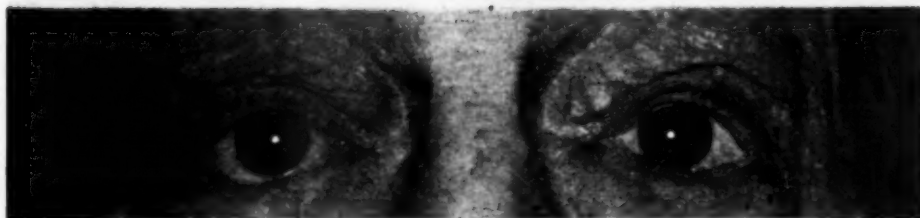
BEFORE**AFTER**

Fig. 4 (Lebensohn). (Above) Appearance of patient after having had a bilateral unsuccessful Wheeler operation the year previously. (Below) Five weeks after a bilateral lower-lid Machek operation. The horizontal skin flap in the right lower lid was cut in the middle forming two flaps attached at either end of the lid. The operation on the left lower lid was as indicated in the previous diagrams.



Fig. 5 (Lebensohn). Nine months after bilateral operation for senile entropion. The right lower lid had a Butler operation; the left, a lower-lid Machek operation. Both lids have now an identical appearance with an equally excellent functional result.

cellent functional and cosmetic result for which the patient was most grateful (fig. 4). The right eye had a tendency to somewhat more epiphora than the left so that the variation there done is not recommended.

The second patient, aged 72 years, was operated October 20, 1951; on the right side with the Butler procedure, and on the left side with the lower-lid Machek operation as described, except that the inferior incision did not go through the central five-mm. area which was left intact. A week later both operations were found effective but the left lid margin was cosmetically natural while the right presented a noticeable central bulge. The left lower lid, however, showed a dimpling of the skin at the central intact area. Nine months later these defects had disappeared and both lids had an identical unblemished appearance (fig. 5).

DISCUSSION

As emphasized by Fox,² senile entropion of the lower lid and spastic entropion are distinct entities. The latter, an acute process that may occur at any age, is precipitated by inflammation, trauma, or patching and is effectively controlled by conservative measures.

Senile entropion, however, is determined by senile degenerative processes that occasion both a relative enophthalmos from the ab-

sorption of orbital fat and a synchronous relaxation of the tarso-orbital fascia and overlying tissues. As a mechanical consequence, the latter no longer maintain the lower tarsal border snugly against the globe and, with this counterpressure lacking, the constantly taut muscle of Riolan inverts the lid.

Operations designed to combat spasticity are hence fallacious. These include canthotomy, alcohol injection, and excision of a strip of orbicularis muscle. Tightening the skin, accomplished by the Ziegler cautery puncture or the Celsus operation and its various modifications, is only temporizing as the relaxing process inevitably continues.

The simple Butler operation and the reconstructive elaboration by Fox³ are both usually effective.* Clark's operation (hitherto not described in the literature) or the lower-lid Machek procedure, both of which provide pressure on the lower tarsal border, are likewise definitive but do not disturb the integrity of the tarsus or the lid border, nor require stitches on the conjunctival surface that might deleteriously affect a susceptible cornea.

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* Recurrences which have occasionally followed the technique of Butler and the original version of Fox³ have been permanently corrected by the lower-lid Machek operation.

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NOTES, CASES, INSTRUMENTS

CYSTIC DERMOID TUMOR

REPLACING THE ANTERIOR SEGMENT OF THE EYE WITH MICROPHTHALMOS

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Dermoid tumors of the eye are classified by Mann¹ in three grades of severity in the following order: Epibulbar or limbal, corneal, and anterior segment.

Cases of the epibulbar type, usually found at the limbus, are common, while the type involving the entire cornea or the full thickness of the sclera are relatively uncommon.^{2, 3}

Examples of the type which replaces the cornea, anterior chamber, iris, and lens, are extremely rare. Only four cases of this type can be found in the literature, and the most recent report is by Mann in 1930.⁴⁻⁷ An unusual case of bilateral limbal dermoids with abnormalities of the anterior segment and preservation of vision was reported recently by Garner.⁸

The development of this type of dermoid tumor begins early in the embryo before the beginning of the formation of the lens at about the 4.5-mm. stage.

CASE REPORT

A first-born Negro male infant was seen by one of us (M. R.) at the age of 12 weeks because of an abnormality of the right eye. The baby was otherwise normal on physical examination, and the parents were not aware of any developmental abnormalities in the family for the past two generations.

The right eye appeared as a cystic opaque mass about 12 mm. in diameter, with motion limited in elevation and adduction. The lids, lacrimal apparatus, and conjunctiva were normal. The left eye, adnexa, and fundus were normal when examined under general

anesthesia. The cystic mass in the right orbit was removed for cosmetic and diagnostic purposes.

When studied pathologically, the gross specimen fixed in formalin consisted of a small mass of tissue measuring 10 by 12 mm., one pole of which was pigmented, while the opposite pole was cystic and contained a clear fluid.



Fig. 1 (Raifford and Dixon). Cystic dermoid tumor—(A) replacing structures of anterior segment of, (B) rudimentary eye ($\times 8$. AFIP Acc. 501026).

Microscopically there were two components of the specimen: A cystic dermoid tumor anteriorly, and the rudimentary structures formed by the primary optic cup with its associated mesodermal structures posteriorly (fig. 1).

The dermoid tumor had two cystic compartments both of which were lined by squamous epithelium. One compartment was only two mm. in diameter, while the larger measured nine mm. in diameter. Its anterior surface was covered by partly keratinized epithelium. The stroma of the cyst wall contained adipose tissue, sebaceous glands, glands resembling Krause's glands, hair follicles, sweat glands, and blood vessels, all embedded in collagenous tissue (fig. 2).

At the junction of the cystic dermoid tu-

Fig. 2 (Raiford and Dixon). Detail of section of dermoid tumor at (2) in Figure 1 showing adipose tissue, glands, and hair follicles ($\times 45$. AFIP Acc. 501026).

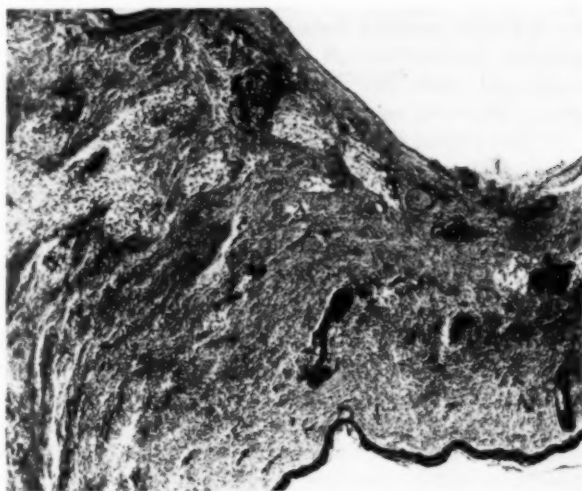


mor and the rudimentary eye, there was a ring of involuntary muscle lying concentric with and adjacent to the rim of the optic cup, possibly an aberrant ciliary muscle.

The rudimentary eye consisted of scleral, choroidal, and retinal tissues (fig. 3). Its sclera was fused anteriorly with the wall of the dermoid cyst and, posteriorly, a scleral opening contained prolapsed retinal and choroidal tissues.

The optic disc and nerve were not present and the posterior scleral opening appeared to be surgical. The anterior opening of the vitreous cavity was formed by a rim of rudimentary ciliary processes and represented the opening of the primary optic cup. There was no communication between the cavity of the dermoid cyst and the vitreous cavity.

The choroidal tissue lining the inner wall of the sclera was continuous with the in-



voluntary muscle anteriorly. Bruch's membrane was not identified. A ciliary nerve entered the choroid posteriorly and traveled anteriorly through the choroid to become lost in the involuntary ciliary muscle.

A layer of pigmented epithelium lined the inner surface of the choroid and extended anteriorly where it ended in convolutions resembling rudimentary ciliary processes.

In some areas the retina was reasonably well differentiated and, anteriorly, it was continuous with a single layer of nonpigmented epithelium extending over the pigmented epithelial layer of the rudimentary ciliary processes.

The layers of the retina identified were: Rudimentary rod and cone layer, outer limiting membrane, outer nuclear layer, outer plexiform layer, inner nuclear layer, and inner plexiform layer. The inner lay-

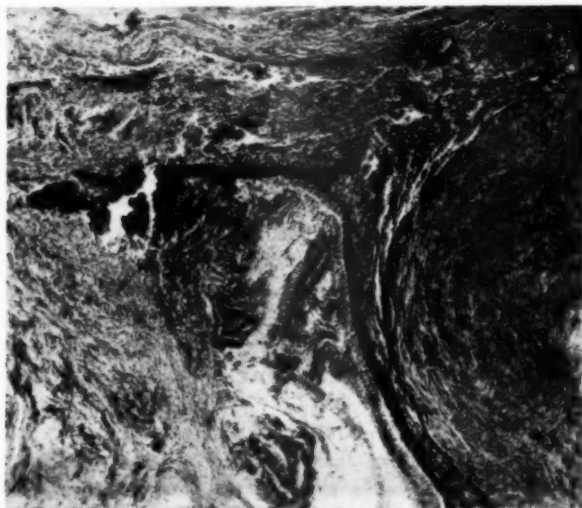


Fig. 3 (Raiford and Dixon). Detail of section of rudimentary eye at (3) in Figure 1, showing pigmented retinal and ciliary epithelium, folded retina, choroid, and sclera ($\times 70$. AFIP Acc. 501026).

ers had their capillary beds. Structures resembling the ganglion-cell layer, nerve-fiber layer, and inner limiting membrane were present but could not be positively identified.

Folded retinal tissue, many rosettes, and particles of calcium filled the posterior part of the vitreous space, while the anterior portion was filled by vascularized mesenchymal tissue entering the anterior opening of the optic cup.

Serial sections failed to demonstrate any trace of lens or iris tissue.

COMMENT

The etiology of dermoid tumors is controversial; however, they are congenital anomalies rather than true neoplasms. The previous cases of the type reported here have been explained by aberrant development of the mesoblastic tissue which forms the structures between the surface ectoderm

and the neuro-epithelium of the primary optic cup. Its origin before the 4.5-mm. stage could account for the absence of the lens. Garner's case,⁸ with preservation of vision, apparently began after the 13-mm. stage when the lens capsule had formed.

In the case reported here squamous epithelium lines the cystic cavities of the tumor. It presumably arrives at this location by the same mechanism of invagination of the surface ectoderm which forms the sebaceous glands and hair follicles embedded in the stroma of the cyst wall.

The microphthalmos with faulty development of the neuro-ectoderm and its associated mesodermal structures is probably due to a failure of growth, because of the absence of the anterior segment of the eye.

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EPISCLERITIS AND ERYTHEMA NODOSUM*

A COLLAGEN SYNDROME: CASE REPORT

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It would seem apparent from reviews that no longer can such diseases as scleritis, episcleritis, tenonitis, iritis, and the so-called rheumatic diathesis be considered separate entities, affecting separate organs, as formerly believed by Morgagni, but rather they

have a common denominator which makes them related one to another.

Collagen, a protein mesenchymal derivative, is common to all the tissues involved by these conditions—the sclera, the dermis, and the walls of the blood vessels. Since we must conclude, therefore, that certain tissue systems are affected, it is necessary to change our concept of these tissues—no longer should we think of them as inert substances but rather as active, responsive, and inter-related.

From a chemical standpoint, collagen consists of many polypeptide chains. Its large molecule is made up of several amino acids, that is, one-third glycine, one-third proline

*From the service of Dr. Carroll R. Mullen, Wills Eye Hospital. Read at the general staff and residents meeting, April, 1952.

and hydroxy-proline; part of the remaining residue is alanine. On boiling with dilute acid, collagen will form gelatin. Its chemical formula approximately consists of 50.75-percent carbohydrate, 6.47-percent hydrogen, and 17.86-percent nitrogen.

It would seem that this intercellular substance is subject to hypersensitivity reactions. This is dramatically demonstrated by its response to ACTH and cortisone. Locally, the sensitivity is characterized by a typical reaction known as fibrinoid degeneration, in which a physicochemical change takes place and a fibrin and hyaline replacement of collagen fibers and their supportive ground-substance occurs.

The etiologic factors credited with bringing about these changes are many and to the original rheumatoid diathesis have been added the allergic factors and many specific diseases. Some of the many factors credited with being possible causes of affections which may involve the skin, blood vessels, or sclera are:

A. SPECIFIC DISEASES

1. Rheumatism and rheumatoid arthritis
2. Pyogenic metastasis
3. Tuberculosis
4. Leprosy
5. Syphilis
6. Periarteritis nodosum
7. Disseminated lupus erythematosus
8. Sarcoidosis
9. Hodgkin's disease
10. Gout

B. LOCAL SCLERAL ALLERGIC RESPONSE

1. To tubercle infection
2. To focal dental, tonsillar, and genitourinary infections
3. To focal gynecologic infection in young women

C. LOCAL SCLERAL RESPONSE

1. To chemical and physical irritants
2. To drug sensitivity (for example, atropine)

3. To bacterial sensitivity

D. SPECIFIC COLLAGEN GROUP

1. Polyarteritis nodosum
2. Rheumatoid arthritis
3. Disseminated lupus erythematosus
4. Dermatomyositis
5. Scleroderma
6. Temporal arteritis
7. Serum sickness

In erythema nodosum, we find that patients generally show a systemic response characterized by fever, malaise, and, at times, pains in the joints and lower extremities, or an associated acute infection of the upper respiratory tract. It is most frequently found in young women.

CASE REPORT

The following case report illustrates the many factors which had to be considered in what at first appeared to be a simple episcleritis.

Mrs. A. D., a white woman, aged 21 years, first was seen in Dr. Mullen's clinic at Wills Eye Hospital on July 16, 1951. Her chief complaint was pain and redness of the left eye following trauma six months previously.

Thorough questioning revealed that her eye had become red and sore 24 hours following a blow from a fist. She had been treated with mydriatics and topical cortisone and carefully watched by a local doctor. Apparently she did well until six weeks ago when a corneal ulcer developed. This apparently cleared in several days and she was improving until three weeks ago. During the last three weeks the eye became progressively worse and marked photophobia developed.

The past medical history was essentially negative, as was the family history. She had had her present glasses for five months. Vision without correction was O.D., 6/21; O.S., 6/21—, With correction, it was O.D., 6/6—1; O.S., 6/12.

Slitlamp examination showed that the cornea of the left eye was slightly hazy with moderate ciliary injection. The anterior chamber showed a three-plus flare with occasional cells. An occasional small keratic precipitate was noted on the endothelium and anterior lens capsule. Findings in the right eye were negative. Fundus findings were apparently normal in both eyes.

The patient was admitted to Wills Eye Hospital on July 17, 1951. Examination gave essentially the same findings, although a small embedded foreign body was noted in the right cornea below the pupillary area about the level of Bowman's mem-

brane. The admitting diagnosis was anterior uveitis, left eye.

The patient was given all of the routine laboratory tests including tuberculin, Frei, brucella agglutination and skin test, Weil's agglutination, chest and sinus X-ray studies, dental and ear, nose and throat consultations, complete blood count, and sedimentation rate. The reports from these tests were all negative except for a seven-percent eosinophilia and a 24-mm. sedimentation-rate index in 60 minutes.

The patient was placed on atropine (one percent, three times daily, left eye), cold compresses, and cortisone (1:4 dilution) every hour. In view of the persistent flare and circumcorneal injection, she was started on ten million units of typhoid and subjected to six bouts of fever. Her last dose of typhoid was 130 million.

By August 2nd, 16 days following admission, she was very much improved and was discharged to the clinic on one-percent atropine sulfate to the left eye, twice daily, cortisone (1:4 dilution) every two hours, and hot compresses for 20 minutes four times daily.

The following check-ups were charted:

1. August 9, 1951, one week later, she was seen in the clinic and doing well.

2. September 6, 1951, the left eye was red, active, and tender. She was seen by Dr. Leopold and sodium salicylate and sodium bicarbonate (10 gr., four times daily) were added to the local therapy she was getting.

3. September 20, 1951, the eye looked much better.

4. October 8, 1951, another flare was present in the left eye, which was quite red and painful. The patient thought this was because soap had been splashed into the eye.

5. October 29, 1951, improved; salicylates stopped.

On February 11, 1952, an acute scleritis and episcleritis was present on the temporal side of the right eye. The patient refused hospitalization and was continued on the same medication. By March 10, 1952, one month later, a marked nodular episcleritis and scleritis was noted in the temporal area of the right eye, and the patient was admitted to Wills Eye Hospital.

On second admission uncorrected vision was: O.D., 6/15+; O.S., 6/12+1. With pinhole: O.D., 6/9-1; O.S., 6/6.

Slitlamp examination showed: O.D., a corneal ulcer near the limbus at the 9-o'clock position, positive staining, with a surrounding area of keratitis. In the anterior chamber, there was no flare or no cells. Fundus findings were negative in both eyes.

The patient was placed on topical cortisone and daily subconjunctival cortisone plus hot compresses.

She was also given colchicine salicylate (0.01 gr., three times daily) plus sodium salicylate (15 gr., three times daily) as trial therapy.

Laboratory tests, including total protein and A.G. ratio, skin sensitivity tests to second strength tuberculin, to staphylococcus, and streptococcus showed as the only positive findings: (1) Elevated eosinophilic count of 291 cells per cu. mm.; (2) elevated sedimentation rate of 23 mm. per 60 minutes.

In view of the presence of multiple indurated skin lesions over the pretibial areas of both legs, consultations were requested of the medical and dermatologic staffs. These skin lesions, which had been present since Thanksgiving of 1951, were dark brown in color, varying in size from one to four cm., and were well circumscribed and indurated. They had been treated by her local physician with penicillin parenterally and aureomycin orally, and by desensitization with *Staphylococcus toxoid* vaccine but with very little effect. The diagnosis by the skin department was erythema nodosum.

The patient was given cortisone in 100-mg. doses for a total of 900 mg. over a period of several days. During this therapy, the corneal ulceration and episcleritis entirely cleared and the anterior chamber showed no flare on her discharge from the hospital on March 27, 1952. Her leg lesions also were slightly improved, less indurated, and not tender.

CONCLUSION

As Stillerman, Swan, and Klemperer have suggested, it would seem that episcleritis can no longer be considered a local entity. The sclera must be treated as actively as all of the other vital and interrelated tissues of the eye.

We must keep in mind that lesions in other collagenous structures may and often do show related tissue response to those occurring in the eye.

The dramatic response of these tissues to ACTH and cortisone should stimulate further studies to determine the etiologic nature of this allergic (or hypersensitivity) type of response.

To conclude, our concern is with the entire mesenchymal defense unit, as well as with its relationship to antibody and immune-globulin formation.

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TRANSPARENT TRANSPLANT AND GOOD VISION

AFTER LOSS OF LENS IN KERATOPLASTY

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Dislocation and herniation of the lens into the hole in the cornea is a complication which may occur immediately after corneal trephination in keratoplasty. That this complication may occur has been mentioned¹ and Castroviejo² stated that injury to the lens in keratoplasty is one of the most serious complications.

Methods which deal with this complication have been mentioned.³ Castroviejo¹ states that, if injury to the lens occurs, as much of the lens should be removed as is possible and that, afterward, the transplant should be sutured directly to the cornea of the host. Stallard³ states that Arruga has devised an obturator to hold back the vitreous while the sutures are placed after expulsion of the lens.

An incomplete review of the literature discloses only one case¹ which suffered this complication in keratoplasty and this is without report of postoperative course or vision.

The case which we report is one in which, in spite of dislocation and herniation of the lens into the hole in the cornea, a final visual acuity of 20/20 was obtained.

CASE REPORT

Mrs. K., a white woman, aged 48 years, when seen first by us had suffered progressive loss of vision from young adulthood until about 15 years ago. At that time, vision in each eye was perception of motion of nearby persons and objects. Vision had remained at this level for the past 15 years.

Examination disclosed vision and appearance of the corneas to be similar in each eye (fig. 1). Vision was recognition of movements of a hand



Fig. 1 (Daily and Daily). Photograph showing marked opacification of cornea of unoperated eye. Preoperative appearance of fellow eye resembled this closely.

at a distance of about one foot. Grossly, the corneas were so opaque that the irises and pupillary margins were visible only in intense illumination. There was a coloboma of the iris of the left eye which had been made many years ago by iridectomy in an unsuccessful attempt to improve vision.

Bi microscopic examination disclosed numerous corneal opacities of granular and macular configurations. The opacities were close together and often confluent. They extended almost to the periphery of the cornea in all directions, but were most dense in the center. They occupied all levels of the corneal stroma.

No history was obtained of a similar disease in the family, nor were any relatives examined because they live at a distance. In spite of the negative family history, a diagnosis of advanced corneal dystrophy of the type described by Groenouw was made.

A keratoplasty was done on the right eye at the Memorial Hospital. Immediately after trephination, during which a small part of Descemet's membrane was not perforated, the lens prolapsed into the hole in the cornea, and the capsule of the lens ruptured at once.

A spatula was placed on the half of the lens which protruded from the eye while the remainder of Descemet's membrane was sectioned with scissors, and 60 units of d-tubocurarine was injected slowly into a vein.



Fig. 2 (Daily and Daily). Photograph showing appearance of eye after corneal transplantation with herniation of lens and subsequent discission.

After five minutes, palpation with the spatula on the lens seemed to indicate that the ocular tension had diminished. Then most of the lens was removed from the eye with forceps and by irrigation; the posterior capsule of the lens and some cortex were left in the eye.

A spatula was placed across the corneal opening and held back the intraocular contents while the initial sutures were inserted into the borders of the transplant and cornea of the patient. A total of 10 corneal sutures were placed using the corneal needles designed by Barraquer and manufactured by Grieshaber. During the insertion of sutures a solution of pilocarpine was dropped on the cornea frequently. It was observed that before the last suture was placed, the anterior chamber had partly reformed. At the end of the operation, eserine ointment was instilled into the conjunctival cul-de-sac.

At the first dressing, 24 hours later, it was observed that the anterior chamber was formed. Atropine was instilled at this time and at each subsequent dressing. The postoperative course was uneventful. The graft maintained a sparkling clarity from the first. However, the unabsorbed portion of the lens formed a secondary cataract which reduced the vision of the eye to perception of light.

Three months after the keratoplasty, a discission with a Ziegler knife was attempted and was unsuccessful because of the density of the secondary membrane.

Discission was repeated one month later with a Wheeler knife, and a black pupil resulted. After this discission, with a correction of $+11.5D$, sph. $\ominus +2.0D$, cyl. ax. 70° , the vision of the patient was 20/40 and improved to 20/20 after this correction had been worn for three weeks. This acuity has persisted until the present time, eight months later. The graft is also of undiminished clarity (fig. 2).

SUMMARY

Keratoplasty for corneal dystrophy was complicated by partial extrusion of the lens after the corneal trephination. Despite this complication, clarity of the graft persisted. Discission of a secondary membrane four months after the keratoplasty resulted in corrected visual acuity of 20/20.

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TRAUMATIC DETACHMENT OF RETINA AND OF PARS CILIARIS RETINAE

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Detachment of the pars ciliaris retinae has not been frequently recorded. Duke-Elder¹ states that the cells of this layer are attached to the pigment epithelium by the same cement substance which binds the pigment cells together, so that the layer does not detach as does the homologous structure in the retina.

Reese,² however, has described, as of frequent occurrence, small cysts arising from the anterior portion of the corona ciliaris and particularly at the base of the iris. The walls of these cysts are composed in part of the nonpigmented layer and in part of the pigmented epithelium and actually represent a localized separation of the two layers.

Klien³ has described both the clinical and pathologic appearance of detachment of the pars ciliaris retinae.

The two cases observed clinically were both eyes containing malignant melanomas of the choroid and secondary retinal detachments. The detached pars ciliaris retinae in both cases took the form of an avascular transparent membrane of extreme delicacy bulging toward the lens. Histologic confirmation of the diagnosis was obtained after enucleation.

Detachment of the unpigmented ciliary epithelium was found in eight of 14 enucleated eyes containing malignant tumors of the posterior segment. The condition was also observed in six enucleated eyes with retinal detachment. In five of these the detachment was a disinsertion and had followed violent trauma. In the sixth, the detachment had followed the perforation of a corneal ulcer.

Klien states that the primary factor in the pathogenesis of detachment of the pars ciliaris retinae is an increased pressure in the subretinal space of either hemorrhagic

or transudative origin. The condition has not been observed in retinal detachment in which there is merely a reduction of the intraocular pressure. Klien points out that the presence of detachment of the pars ciliaris retinae is of considerable diagnostic significance in cases of suspected intraocular tumor.

CASE REPORT

We have had the opportunity to observe a case of detachment of the pars ciliaris retinae associated with retinal detachment.

K. H., a truck driver, aged 32 years, was struck violently in the left eye with pliers in November, 1948. The blow broke his glasses and produced a scleral rupture temporally. The scleral wound was repaired by Dr. William H. Droegemueller of Greeley, Colorado, to whom we are indebted for his observations and for the opportunity of seeing the case.

Dr. Droegemueller reported that there seemed to be a partial dislocation of the lens immediately after the injury. The anterior chamber was approximately three times the normal depth. After the scleral rupture was closed, the lens assumed the normal position. There was hypotony for a time but, by the end of a month, the eye had largely recovered.

Vision improved to 20/20, although the refraction had changed from $-1.25D$. sph. to $+0.75D$. sph. $\ominus +2.0D$. cyl. ax. 115° . In January, 1951, Dr. Droegemueller found a retinal detachment and referred the patient to us.

At our examination of January 26, 1951, we found the vision of the left eye to be 20/25 with a $-1.25D$. sph. The anterior chamber was of normal depth. The tension was 12 mm. Hg (Schiotz).

On dilatation of the pupil, a delicate grayish membrane could be seen projecting forward from the region of the ora serrata. This membrane ex-



Fig. 1 (Long and Danielson). Detachment of the pars ciliaris retinae.

tended from the 4:30- to the 11-o'clock position and presented a finely crenated but otherwise uniformly concave border. The membrane was translucent and showed faint striae which were almost horizontal.

The fundus presented a most striking appearance. There were numerous yellowish-white lines extending both above and below the disc nasally, some of them reaching well into the periphery inferiorly. These lines presented the usual appearance of choroidal ruptures but were present unaltered in areas in which the retina was detached. The detachment of the retina was rather low and was confined to the inferior periphery. Prolonged search, carried out with extreme mydriasis and with pressure over the ora, failed to reveal any tear or disinsertion. It was our impression that the retinal detachment was continuous with the detachment of the pars ciliaris retinae.

On February 7, 1951, a diathermy operation for retinal detachment was done. A double row of partially penetrating diathermy applications, using the Pischel electrode and 55 ma. of current, was carried out at 13 and 14 mm. posterior to the limbus from the 4- to 12-o'clock positions.

Drainage was obtained by several punctures of the penetrating electrode anterior to the line of barrage. On two occasions, as the subretinal fluid escaped, the translucent membrane almost disappeared, only to resume again its original position.

Healing occurred without incident and resulted in complete reattachment of the retina. The detachment of the ciliary epithelium remained unchanged.

Unfortunately, four months after the operation, following the extraction of a tooth, the retina

again became detached. When reexamined in March, 1952, the retina was largely detached and vision was reduced to the perception of large objects. The detached pars ciliaris retinae was clearly evident but appeared somewhat more frayed than when originally seen.

CONCLUSIONS

We believe this to be a case of anterior dialysis or disinsertion of the pars ciliaris retinae with separation from the pigmented epithelium. As the process extended more posteriorly, the peripheral retina also became involved in the separation. This seems to be an instance in which the retinal separation was not due to a retinal tear or disinsertion but rather to a disinsertion at the anterior margin of the ciliary epithelium, fluid entering the subretinal space around the edge of the torn epithelium.

This case differs from those described by Klien in that the anterior margin of the pars ciliaris retinae was torn free at the iris root. In her cases the epithelium remained adherent anteriorly and the pressure of the subretinal fluid extending forward detached the pars ciliaris retinae and caused it to balloon forward.

324 Metropolitan Building (2).

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METHOD TO SET PROSTHESES IN DEFORMED ORBITS*

J. J. SZMYT, M.D.
Polska, Poland

After concussions, contusions, burns, or other injuries which destroy or deform the soft tissues of the orbit, it is frequently impossible to insert the eye prosthesis after enucleation, sometimes even when the atrophic eyeball is still present. Such impediments to prosthesis fitting as adhesions of

greater or less degree, symblepharons, and deformities of the lids, often accompany these injuries, and provide further complications.

Plastic operations, using skin or mucous membrane from the mouth according to the methods of Czapody, Haitz, May, or Morton, may be necessary, and such operations may be performed successfully even after some time has elapsed. However, since the chief aim of a prosthesis is a cosmetic one and the lack of an eye usually depresses the patient, I sought for a new and simple

* From the Central Ophthalmological Dispensary.

method which would eliminate the need for plastic repair.

First, I considered the fact that the prosthesis is usually placed perpendicularly in the front of the orbit, close to the eyelids, while the rest of the orbit is left empty. The posterior part of the prosthesis is usually smaller than the anterior in order to provide for adhesions or the smaller capacity of the conjunctival sac.

It seemed to me that operation might be performed only in the anterior portion of the conjunctival sac under the following conditions: when no massive symblepharon was present, when there were no extensive adhesions, and when the bony edges of the orbit, especially of the lower part, were intact. Moreover, the eyelids should be elastic and the orbicularis in good condition.

OPERATIVE TECHNIQUE

Anesthesia. The field is anesthetized with two-percent solution of novocaine.

Incision. After the lids have been separated as far as possible with the blepharostat and the white-rosy chords and fibers of the symblepharon can be visualized well, dissection is begun. The depth of dissection, usually three to five mm., depends on both the existing and the desired capacity of the conjunctival sac.

The channel is cut parallel to the free edge of the lid (seldom is it done simultaneously on the upper lid) and two to four mm. from the free edge. The sterilized edge of the prosthesis is now inserted deep into the channel and a tarsorrhaphy with one suture only is performed to keep the prosthesis in position.

Sulfonamide powder is applied and a dry dressing covers the eye. The suture is removed in three days.

Results. The best cosmetic result is achieved when the prosthesis used is larger than necessary in order to make the capacity of the conjunctival sac as great as possible. Results are usually satisfactory, sometimes excellent even when compared to cases in

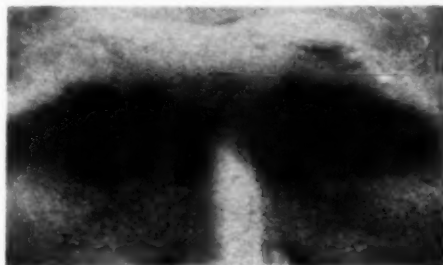


Fig. 1 (Szmyt). Case 1. Postoperative appearance.

which plastic operations of the conjunctival sac have been performed.

CASE REPORTS

CASE 1

Gr. K., aged 20 years, was injured on May 21, 1945, by shrapnel from a mine explosion. Three fingers were torn from his left hand and his left eye was injured. He was treated for a fortnight at the local hospital of Opoczno before the injured eye was removed.

When he appeared at the Central Ophthalmological Dispensary about the middle of January, 1950, examination showed the conjunctival sac of the left eye to be filled with symblepharon and scars. The adhesions were not too extensive. The lower lid was scarred.

Operation according to the method already described was performed on January 15th. The suture was removed in four days. The prosthesis was in good position and has remained so (fig. 1). The cosmetic effect would have been as excellent as the surgical results if it had been possible to obtain a proper prosthesis. However, the patient was satisfied since he obtained his prosthesis without having to undergo extensive surgical proceedings. The prosthesis is comfortable and retains its position.

CASE 2

J. N., aged 28 years, a clerk, was scalded with boiling water during early childhood. His eye was saved but visual acuity was diminished. The movements of the eye were also limited. At the age of



Fig. 2 (Szmyt). Case 2. Postoperative appearance.



Fig. 3a (Szmyt). Case 3. Preoperative appearance.

eight years, he suffered from an ulcer of the cornea which perforated and left the eye atrophic. Several prostheses were fitted but each extruded.

At examination, I found thickened eyelids, a shortened sulcus, entropion, and the conjunctival sac filled with tiny adhesions, especially in the lower part. The atrophic eye was visible in the bottom of the orbit.

Operation was performed without event on January 22, 1950, and the postoperative course was uneventful. The prosthesis retains its position and the cosmetic result is satisfactory (fig. 2).

CASE 3

R. St., a 26-year-old officer, was in a motor car accident on October 17, 1950, and suffered serious facial injuries. His eyelids were torn out and the eye, itself, was punctured, the contents being lost. The eyelids were sutured into proper position but the orbital capacity was so diminished and adhesions so extensive that prostheses extruded.

On November 29th, I operated according to the technique herein described and completed the opera-



Fig. 3b (Szmyt). Case 3. Postoperative appearance.

tion with tarsorrhaphy. In six days, the patient was ready to leave the hospital.

Considering the extent and seriousness of the injuries, cosmetic results in this case are satisfactory (figs. 3a and 3b). The prosthesis retains its position.

CASE 4

O. St., a farmer, aged 21 years, was hit directly in the left eye with a bullet fired at the distance of two meters. The eye was enucleated and the wounds of the conjunctiva and skin of the upper lid were repaired. Healing took place by second intention.

Although the wounds of the conjunctival sac and



Fig. 4a (Szmyt). Case 4. Preoperative appearance.

upper lid were healed within a fortnight, the capacity of the conjunctival sac was so small and the adhesions were so extensive that it was impossible to fit a prosthesis.

My operation was performed and the procedure was completed in three days. The upper lid still shows defects which will be repaired at a later date by Landolt's plastic operation. Figures 4a and 4b show the patient's appearance before and after operation.



Fig. 4b (Szmyt). Case 4. Postoperative appearance.

DISCUSSION

The success of this simple and easy surgical procedure may be attributed to: (1) The formation of a new scar which strengthens the lower lid so that it is able to hold the prosthesis in firm position; (2) the continuity of the mucous membrane is

interrupted and why this seems to produce beneficial results, I am not yet able to explain.

Admittedly, the technique of the procedure herein described can be further perfected by simplifying some of the details and omitting the unnecessary stages. It must be modified so that it can be used in cases in which unusual complications are present. I must stress that success with my technique depends upon: (1) Proper preparation of the channel; (2) careful fitting of the posterior portion of the prosthesis into the channel; (3) tarsorrhaphy to maintain the position of the prosthesis, for it is essential that the prosthesis be pressed firmly into the channel.

SUMMARY

The advantages of fitting a prosthesis according to the technique herein described are:

1. The operation is easy to perform.
2. It may be performed at any dispensary and time required for hospitalization is minimal.
3. Treatment time is shortened.
4. It spares the patient's strength as well as his pocketbook.
5. It is an excellent alternative orbital operation.
6. Once the prosthesis is set in the correct position, it does not extrude.

Lodz Gdanska 115.

AN IMPROVED CHALAZION FORCEPS

FREDERICK A. WIES, M.D.
New Haven, Connecticut

All the chalazion forceps that I have used have had definite disadvantages.

It has frequently been impossible to place a forceps with a rounded top far enough into the fornix to expose the cyst properly. Even when the cysts were where exposure was easy, the forceps would frequently slip from its position, unless undue pressure was made on the lid by tightening the adjusting screw.

Those forceps without a bend in the shaft did not conform to the cheek and for this reason alone were unsatisfactory.

The forceps herein described (fig. 1)* overcomes these difficulties. It is flattened on top, allowing one to place it deep into the fornix, thus exposing cysts far from the edge of the lid. The transverse serrations allow the forceps to stay in place without



Fig. 1 (Wies). An improved chalazion forceps.

making undue pressure on the lid. The bend in the shaft of the instrument permits it to rest on the cheek or forehead in a convenient position.

The forceps, which measures 10 cm. in length, has been used in many cases of chalazia with entire satisfaction.

255 Bradley Street.

* Made by the Storz Instrument Company, St. Louis, Missouri.

SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

April 7, 1952

DR. ADOLPH POSNER, *president*

I. PANEL DISCUSSION

DIAGNOSTIC CRITERIA IN CATARACT SURGERY

DR. RUDOLPH AEBLI stressed the importance of good local anesthesia instead of focal anesthesia. The indications and contraindications for intracapsular, round-pupil extraction were discussed.

In physically active people with mature cataracts, he favors an extracapsular with an anterior capsulectomy. The retention of the zonular capsular barrier acts as a bulkhead and adds to the integrity of the anterior segment of the eye. No postoperative iridodonesis or herniation of vitreous into the anterior chamber is present after such extractions.

In cases of mature cataracts or tumescent lenses with shallow chambers, elevated tension, and a congested eye, Dr. Aebli said he prefers an incision ab externo with a broad iridectomy and removal of the lens when the eye is quiet.

In traumatic cataracts with no tension, it is better to wait until the lens is uniformly opaque, and then extract through a keratome incision, with a well-dilated pupil, do an anterior capsulectomy, and wash out the flocculent lens material. If increased tension develops, early removal of the lens is essential.

In binocular congenital cataracts when vision is reduced to 20/200 or less, Dr. Aebli favors early operation. In monocular congenital cataracts with good vision in the other eye, he does not favor early surgery, but prefers to wait until the pupil is opaque and then operate for cosmetic reasons.

DIAGNOSTIC CRITERIA IN STRABISMUS SURGERY

DR. GLEN G. GIBSON said that the popular methods for determining the time, kind, and amount of operation for strabismus are undergoing a change. This change consists of abandoning the former mathematical methods of determining the amount of correction.

Dr. Gibson said that the method which he has found practical consists of dividing patients into two groups: the early and the late cases. Early cases are those in which strabismus has been present less than one and one-half years. Late cases are those in which strabismus has been present longer than two years.

The early cases are operated by a conservative procedure, preferably marginal myotomy when the indications are correct. Marginal myotomy, as described by Chavasse, is preferred.

The correction in the position of the eyes is brought about by stretching of the muscle, which almost always occurs in the correct amount regardless of the amount of deviation. One depends, in these suitable patients, on the development of normal or peripheral binocular vision to maintain the alignment.

In the late cases, when the binocular reflexes are impaired from disuse, one has to depend on the standard muscle operations to obtain and maintain the corrected position. By dividing the usual amounts of operative correction into four grades, and the amount of deviation into four grades, and using those amounts of correction as measured in millimeters, a satisfactory degree of correction has been obtained.

More important than the standard diagnostic test for measuring the exact objective and subjective deviation, is the proper interpretation of the time factors in strabismus. The time factors are the age of onset, the

duration of the deviation, and the age of the patient. By noting the time at which there was a discontinuance of development of normal binocular vision, and by comparing the amount of impairment which has occurred from disuse with the normal development curve of binocular vision, it is possible to estimate whether to rely on the binocular reflexes for the maintenance of the surgically obtained alignment. If not, it is necessary to depend mainly on changing the action of the muscles by the standard methods of operation.

DIAGNOSTIC CRITERIA IN RETINAL DETACHMENT SURGERY

DR. HENRY MINSKY discussed the diagnostic steps when retinal-detachment surgery is being considered.

1. *The differential diagnosis* in retinal detachment concerns itself with determining: (a) The cause for the detachment—spontaneous inflammation, injury, or tumor; (b) the presence of a break in the retina; (c) by the total number of breaks; (d) the projection of these tears onto the sclera, so as to select the site for the diathermia attack or scleral resection; (e) the presence or absence of a concomitant detachment of the vitreous and hyaloid.

2. *Ophthalmoscopy at a distance.* The concave mirror at a distance has long been used to obtain variations in the fundus reflex. One may suspect the presence of a detachment if the reflex from the periphery of the pupil changes to a yellowish or a bluish color. In addition, Mark Amsler makes the point that the change in color obtained with the plain mirror is an even more delicate test.

3. *Indirect ophthalmoscopy.* This method of examining the fundus is not used routinely as much as it should be. The broader field increases by 25 percent the ability of the surgeon to pick up both a peripheral detachment and its hole, as compared with the findings by direct ophthalmoscopy only. A helpful aid for more and more illumination is the use of a regular three-step bulb em-

ployed in the ordinary bridge lamp. The pupil should be dilated at maximum by the use of neosynephrine (10 percent) drops in addition to the usual mydriatic.

4. *Streak ophthalmoscopy.* In addition to the usual technique of observing the fundus with homogeneous light, considerable help in studying the structure of the retina and especially the margins of the break may be achieved by removing the condenser cap from the bulb. The image of the filament of the naked ophthalmoscopic bulb will then appear on the retina as a streak of light when the head of the ophthalmoscope is replaced.

5. *Proximal illumination.* Furthermore, by observing the retina immediately adjacent to the focused streak of light, one can differentiate a pigmented mass from a non-pigmented one behind the detachment by the brownish hue given to the overlying retina which transmits the light from the pigmented area. This may be termed "ophthalmoscopy by proximal illumination."

The hole in the retina will be seen more easily this way, even if a vitreous haze is present, than by the usual direct illumination. By streak ophthalmoscopy the margins of a tear are critically seen more easily. And the granular appearance of the deeper choroid will differentiate it from a hemorrhage in the retina.

6. *Scheppins' technique.* In this technique, the source of illumination comes from a headlight with a reflecting mirror placed between the eyes so as to achieve binocular vision, and the small condensing lens is 20 diopters in strength.

The fundus picture then is modified by pressing on the eyeball anterior to the equator, with an applicator mounted on a thimble, so as to permit the ora serrata to come into view. In Scheppins' hands more breaks are found than by any other method.

I believe that, if one has the patience and dogged persistence necessary to acquire this technique, the rewards will be ample. I have always been using the indirect method routinely, but it did require weeks and weeks of

trying before I finally could see what Schep-pins describes.

Since he can see the things he describes, the rest of us should also be able to, if we are willing to invest the energy and grit required to master this method of indirect ophthalmoscopy. Perhaps one man in each hospital should be assigned the task of acquiring this skill.

7. *Transillumination.* Most men place the transilluminating instrument against the sclera and observe the difference in hue and intensity of light emitted by the pupil. With the change of application of the transilluminator, the corresponding reduction in intensity, together with a deepening in the hue of light, means an interference to the passage of light by a solid mass.

8. *Contralateral transillumination.* The transilluminator is placed on one side of the eye and the sclera is observed on the contralateral side. In this way a tumor, arising anterior to the equator, is dramatically visualized as a perfectly obvious circumscribed shadow by its interference with the usual glow.

If a tumor of the ciliary body is present and has spread posteriorly, the shadow that the ciliary body normally throws on the sclera shows a projection posteriorly. By ophthalmoscopy alone, the non-transparent, detached retina is illuminated so strongly that it masks the mass behind it.

9. *Slitlamp examination for detachment of the vitreous and hyaloid.* I believe it will become routine to determine before operation, by the use of the Hruby lens, whether or not the hyaloid and vitreous are attached to the diseased retina. We may soon come to the conclusion that the indication for primary scleral resection or its modification is the fact that the vitreous and hyaloid are detached from the retina. This is the present opinion, I believe, of Harvey Thorpe.

10. *Recording findings.* In addition to the field of vision studies, one should chart the fundus, the detached areas, pigment, hemorrhages, and holes on a schematic sheet as

advocated by Amsler and by Scheppins. One may designate a hole by drawing its outline in a rectangle and showing, on the upper border of this rectangle, the related width of the disc.

Below the rectangle, a Roman numeral indicates in which meridian the hole is, and an exponent shows the number of disc diameters it is from the optic nerve. Thus IX⁶ would remind one that the hole was six disc diameters from the nerve in the 9-o'clock meridian and, when compared to the width of the disc, six mm. long.

DIAGNOSTIC CRITERIA IN CORNEAL SURGERY

DR. R. TOWNLEY PATON presented a brief historical résumé of the development of keratoplasty, beginning with Pellier's first description of attempting to make an artificial cornea out of glass in 1789.

The increasing incidence of success in corneal transplantation is due to the following: (1) The improvement in operative technique; (2) the proper selection of cases; (3) pre- and postoperative irradiation treatment of corneal scars in which there is vascularization.

Dr. Paton reviewed the operative results in the following cases: (1) Groenouw's dystrophy, 25 cases; (2) Fuchs's dystrophy, 12 cases; (3) keratoconus, 64 cases; (4) leukoma, 17 cases. The highest percentage of good results was obtained in keratoconus, then in order of sequence, Groenouw's dystrophy, leukoma, and Fuchs's dystrophy.

Five cases of bullous keratitis following cataract operation were markedly improved by lamellar transplantation, as well as two cases of herpetic ulcers.

Dr. Paton then presented a résumé of postoperative complications and their treatment.

II. ROUND-TABLE CONFERENCE

METHODS OF EXAMINATION AND DIFFERENTIAL DIAGNOSIS

What are the indications and contraindi-

cations for corneal transplantation in: (a) Keratoconus; (b) after a lime burn?

DR. PATON replied that a corneal transplant should be tried in keratoconus when (a) a contact lens is not tolerated; (b) when a central corneal scar causes impairment so that, even with a contact glass, the patient cannot work; (c) in rapidly progressing cases. Early operation is easier to perform than later operations.

After lime burn: (a) Lime burn cases in general do poorly because of the extensive vascularization which is present. (b) Beta irradiation is helpful in preparing some cases. Lamellar transplants are a safer procedure in these cases.

Dr. Gibson asked Dr. Paton what he would do in a case of unilateral conical cornea. Dr. Paton replied that he had followed 70 cases of unilateral conical cornea very closely. He said that he must be sure that there is no glaucoma present in unilateral cases. The results are poor and the patients often develop glaucoma, possibly from the trauma. If a unilateral case is progressive, then one might as well salvage what one can.

Dr. Aebli asked: How can one prevent vascularization? He also remarked that he had used irradiation unsuccessfully. Dr. Paton said that he used to believe in not doing corneal transplants in cases with vascularization. He now feels that it is worth trying. Transplantation should not be attempted in an eye which becomes vascularized after the **tension** has been taken. He said that cortisone inhibits the growth of vessels. Beta irradiation is useful in some cases and he mentioned the fact that old trachoma cases are now being operated.

Dr. Posner asked Dr. Paton if it makes any difference whether the vessels are ghost vessels or are still active. Dr. Paton replied that active superficial vessels are not so dangerous as deep vessels. Lamellar graft may be indicated to see what the cornea will stand. It is impossible to determine where growth of vessels will stop. In two cases in

which the trephine had gone into the anterior chamber, the operation was stopped. Nevertheless, the vision improved due to the fact that the scar tissue stopped vessels from growing into the cornea.

Dr. Minsky asked Dr. Paton what he thought of Crawford's work with lime burns. Dr. Paton replied that he had obtained very poor results with Hydrosulphosol but said that it should be tried, certainly in the early stages.

How does the presence of a head tilt in a convergent strabismus affect your choice of surgical procedure?

DR. GIBSON: In convergent strabismus which comes on during the period of development of the binocular reflexes, the presence of a head tilt does not alter the amount of surgical correction necessary to correct the deviation. The presence of a head tilt implies a secondary comitant esotropia following a superior oblique paresis.

If the vertical tropia is of slight degree it is not necessary to correct it. In this instance, the logical approach of removing the cause of convergent strabismus, which would be the correction of the vertical deviation, is not the method of choice because the force which maintains the esotropia is not the vertical deviation but the secondary retinal correspondence which has developed since the onset of the esotropia.

DR. AEBLI said that, if correction of the vertical deviation with prisms makes a marked difference in the lateral deviation, he would try to correct first the vertical deviation. If the lateral deviation is not affected, then he would correct the lateral deviation first.

What is the technique and value of transillumination in cataract?

DR. MINSKY said that the major new development in this connection was the use of the Zeiss slitlamp. With this instrument, using an oblique form of illumination, small vacuoles on the posterior lens surface can be seen.

What would lead you to suspect the pres-

ence of epithelial ingrowth into the anterior chamber after cataract extraction?

DR. AEBLI said that the early signs of epithelial downgrowth are a dull gray area adjacent to the limbus at the site of the section with blood vessels. Dr. Aebli said that it has been his experience that, once epithelial downgrowth starts, all attempts at treatment are unsuccessful. One should prevent development of epithelial downgrowth by having good corneoscleral sutures and a conjunctival flap.

Dr. Posner asked Dr. Paton what he thought was the effect of cauterization on the cornea. Dr. Paton replied that he had had no experience with this therapy. He felt, however, that it could not do much harm. Dr. Berliner mentioned that he cauterizes the cornea to prevent further downgrowth.

(a) What are the indications for lamellar as opposed to penetrating keratoplasty in corneal dystrophies? (b) Can you apply experience gained from one patient to treatment of other members of the same family?

DR. PATON replied: (a) Lamellar transplants are indicated whenever the dystrophy is limited to the anterior one third of the cornea, although the penetrating graft is to be preferred in order to obtain the maximum improvement in vision. In Fuchs's dystrophy the penetrating graft offers the best chance of success, for usually all layers are involved.

(b) Experience gained in operating on one member of the family can be used in operating other members of the same family; as an example, experience in operating three sisters with Groenouw's dystrophy was mentioned.

In a convergent strabismus, if repeated measurements give greatly varying results, which degree of deviation would you aim to correct surgically?

DR. GIBSON said that there are two main

situations in which esotropia is grossly variable.

The first is instances of recent onset in which time has been insufficient to establish a rigid secondary motor and sensory correspondence. He said that he had found marginal myotomy suitable for this type of situation because one is not primarily operating to correct so many degrees of deviation, but rather to prevent the internal recti from overacting. Consequently this procedure, when correctly performed on suitable patients, corrects any amount of deviations under 40 degrees.

The second situation occurs in long-standing esotropia which has developed a diffuse, rather than a precise, secondary retinal correspondence. In those cases, the effort should be to relieve a slight residual esotropia to avoid postoperative divergent deviations.

DR. AEBLI said that, in general, when he has a case of convergent strabismus, which is variable under repeated examination, he tries to eliminate any systemic disturbances. In cases of children with chorea, there may be variation in the strabismus. Atropinization for four to six days is important. Nervous children often show variation. Complete rest is necessary to determine the actual deviation.

Under what circumstances would you operate in a case of retinal tear without detachment?

DR. MINSKY replied that one should not operate until one has found the tear. A possible lead in locating the tear is the history of where the patients first saw spots. Also, there may be clues in the alteration in the light reflex; that is, in which quadrant. Dr. Minsky then suggested that, in such a case, one should go in near the ora serrata, lay down a barrage, aspirate fluid, and let the retina flatten.

BERNARD KRONENBERG
Recording Secretary.

PROGRAM
of the
ASSOCIATION FOR RESEARCH IN OPHTHALMOLOGY

TWENTY-SECOND MEETING

JUNE 1 THROUGH 4, 1953

NEW YORK, NEW YORK

PRELIMINARY SESSION

Monday afternoon, June 1st, at one o'clock

At the: Einhorn Auditorium—Lennox Hill
Hospital

131 East 76th Street

CLINICAL ASPECTS OF VITREOUS-BODY PATHOLOGY

Charles L. Schepens, M.D.

Clinical methods of investigation of the vitreous body are briefly outlined and their limitations are discussed. Observations described in this paper seem to be the result of two phenomena: (1) Traction exerted by a structure in the vitreous upon other tissues which are in contact with it; and (2) migration of exudates and hematogenous pigment through the vitreous.

Traction by structures in the vitreous and migration of exudates and hematogenous pigment through the vitreous are the cause of the phenomena to be described. Often traction seems to be exerted at or near the normal attachments of the vitreous to the globe.

The traction syndrome may cause the following conditions: (1) Anterior vitreous detachment, (2) displacement of ciliary processes, (3) a gray ridge in the middle of the pars plana and perhaps cysts of the pars plana, (4) detachment of the ora serrata from the choroid, (5) small retinal dialyses, (6) avulsion of the vitreous base, and (7) posterior vitreous detachment.

Cases showing the optical appearance of posterior detachment of the vitreous are conveniently divided into two groups:

First are cases without retinal detachment. The lightning-streaks syndrome, certain types of macular pathologic processes, certain alterations of the disc region, and a condition characterized by edema of the posterior pole fall in this category.

The second group includes cases of posterior vitreous detachment associated with retinal detachment. A description is given of

several appearances which probably result from traction by structures in the vitreous, such as equatorial folds, ordinary fixed folds, smooth and shagreen appearance of the detached retina, and massive vitreous retraction.

PHYSICOCHEMICAL STUDIES ON THE VITREOUS BODY

L. Varga, Ph.D., and Endre A. Balazs, M.D.

The high molecular components of the cattle vitreous body have been separated and some of their physicochemical properties have been investigated by ultracentrifugation and electrophoresis. Their behavior will be compared with that of the blood proteins, and with pure hyaluronic-acid preparations from other tissues of the body.

The state of the hyaluronic acid in the vitreous, as revealed in these investigations, will be discussed. The possibility of the formation of protein polysaccharides complex as the basic structural unit of the gel, will be considered.

PROPERTIES OF THE FIBROUS COMPONENT OF THE VITREOUS BODY

A. GEDEON MATOLTSY, M.D.

The present studies reveal that the fibrous component of the vitreous body is not homogeneous but is composed of various fibrous elements. This observation was made in phase-contrast and electron-microscopic studies of low- and high-speed sediments of the fragmented vitreous body.

Low-speed sediments (1800 G) showed under the phase-contrast microscope; (1) Large fibers, 1.0 to 2.0 mm. in length and 5 to 10 mm. in diameter; (2) fibers which frayed into extremely thin fibrils; and (3) a large amount of thin fibrils about 1.0 mm. in diameter, varying in length.

High-speed sediments (22,000 G) contained

the following fibrous elements visible in the electron microscope; (1) A few collagen fibrils; (2) more beaded type of fibrils, representing a new type of fibrous substance with a characteristic axial repeating period of 610 Å; and (3) smooth fibrils in large number, averaging 250 Å in width and exhibiting only a suggestion of a very fine axial repeating period.

The third fibrous element seen in the electron microscope was isolated in a homogeneous fraction and analyzed. It was found to be an insoluble, viscous, thixotropic fibrous protein. The name "vitrosin" was proposed for this protein to distinguish it from other fibrous proteins.

Chemical analyses showed that vitrosin is a protein-carbohydrate complex. Hexosamine could not be detected in vitrosin. The protein component showed a similarity to the chemical and physicochemical properties of collagen. The carbohydrate component made up 7.0 to 9.0 percent of vitrosin; its nature has not yet been determined.

Behavior in polarized light and under varied conditions of temperature and pH will be described. A possible mechanism of shrinkage of the vitreous body, based on the physical properties of vitrosin, will be discussed.

APPLICATION OF PAPER ELECTROPHORESIS TO THE STUDY OF THE SOLUBLE VITREOUS HUMOR PROTEINS

Leroy Schieler, Ph.D.

The paper electrophoretic pattern of cattle, dog, human, and rabbit vitreous humor was determined. The globulin component was shown to be hyaluronidase. The presence of an unidentified basic peptide was verified. The albumin component was found to dissociate at about pH 7.5. The possible physiologic significance of this finding is discussed.

ULTRAVIOLET ABSORPTION OF THE VITREOUS BODY

Endre A. Balazs, M.D.

The light absorption of the human and cattle vitreous body between 200 to 300 mμ, will be described. The effect of different factors on the absorption maximum, such as pH, oxidative agents, temperature, and so forth will be discussed.

The most important components responsible for absorption are ascorbic acid and "soluble"

proteins. Ultraviolet absorption in the vitreous is used as the basis of a new procedure for quantitative determination of ascorbic acid and "soluble" proteins in the vitreous and subretinal fluid.

STUDIES ON THE CORNEA: I. THE FINE STRUCTURE OF THE RAT CORNEA

Marie A. Jakus, Ph.D.

The fine structure of rat cornea, as seen in electron micrographs of thin sections, will be described, and illustrated with representative examples of epithelial cells, stroma, Descemet's membrane, and endothelium.

In the rat, the cells of the epithelium appear not to be connected by cell bridges but to lie in close approximation, those of the inner layers showing a complex interdigitation of peripheral processes. The stroma has as its main structural component collagen fibrils of relatively constant diameter, oriented to form lamellae; Descemet's membrane has been seen to appear "structureless" or quite fibrous, depending on the degree of swelling.

SECOND SESSION

Tuesday afternoon, June 2nd, at two o'clock

At the: Astor Gallery, Waldorf-Astoria Hotel

THE RECORDING OF THE ELECTRORETINOGRAPH IN HUMANS AND IN ANIMALS

I. H. Wagman, Ph.D., Joseph Waldman, M.D., David Naidoff, M.D., L. B. Feinschil, D.D.S., and R. Chahan, M.S.

The methods herein reported are similar basically to those used by other investigators. However, the apparatus and techniques offer a flexible method of recording electrical responses in humans and in animals.

The optical system provides, in effect, two individual and fixed units, one appropriate for humans and the other for animals. The two units share the same light source, and most of the optical components. Each unit is provided with two separate light beams which originate from the same light source and which are eventually combined so that they both arrive at the identical eye position. Each beam can be independently and accurately controlled in regard to the intensity of light, its color, its area, and its position on the retina.

In addition, the duration of the light flash is

controlled separately for each beam by means of an electromagnetic shutter (Husta and Wagman, to be published) which is controlled electronically. The duration of the flash may be varied in a continuous reproducible manner from 1/1,000 second to any longer time.

The circuits are designed to enable (1) independent flashes from each light beam and (2) two flashes, one from each beam, at varying intervals of time.

With the apparatus, therefore, two light flashes, each different in intensity, color, and duration may be imposed on the same eye either at the same or at different retinal points at varying intervals apart. The light beams end in an electrically shielded and thermostatically controlled room in which the subject (human or animal) can be placed in the appropriate position.

ELECTRORETINOGRAPHY IN CASES OF NIGHT BLINDNESS

Lorin A. Riggs, Ph.D.

A convenient method for measuring the electroretinogram in the human eye is to use a conventional plastic contact lens to support the corneal electrode (Riggs, 1941). This technique permits the recording of responses under stable conditions for periods of several hours.

In our laboratory, we have made extensive measurements of the course of dark adaptation, using the electroretinogram as an index of retinal sensitivity. In the course of this work, we have obtained records of three persons with congenital night-blindness; of four with retinitis pigmentosa, and of two with marked foveal impairment of the retina.

The principal component (B-wave) of the electroretinogram can normally be elicited by progressively lower intensities of test light as dark adaptation proceeds.

Results for those with congenital night-blindness show an impairment of the electroretinogram which is roughly parallel to the deficit revealed by adaptometer tests.

With retinitis pigmentosa, however, scarcely any electroretinogram can be elicited even by the most intense stimulation. This finding holds even for a relatively early case in which no marked impairment of dark adaptation or peripheral vision has yet occurred. Thus, the electroretinogram is an extremely sensitive test for the presence of retinitis pigmentosa.

The subjects with marked foveal impairment, on the other hand, showed nearly normal

electroretinographic records.

The present data, together with studies of the effects of colored light, indicate that: (1) The B-wave of the electroretinogram is usually associated with scotopic visual mechanisms; (2) retinitis pigmentosa, even in the early stages, prevents the development of the electroretinographic response; (3) with foveal stimulation, a major part of the electroretinogram may be attributed to the effects of light scattered within the eyeball to peripheral areas of the retina.

THE ORIGIN OF THE ELECTRORETINOGRAM

W. K. Noell, M.D.

The electroretinogram has been analyzed in rabbits by measuring the effects of intravenously administered agents of selective action on the retina.

Employing acute and chronic effects of iodoacetate and iodate, it will first be shown that a sudden change in the steady potential across the eye produced by intravenous sodium azide depends upon the integrity of the pigment epithelium.

The extreme rapidity and ready reversibility of this reaction is taken to indicate that sodium azide—in accord with its effects on other cellular systems—interferes with active ion-transport processes between retina and choroid. These processes depend upon functions of the pigment epithelium. Similarly, the slow corneal-positive components of the electroretinogram (C-wave and others) are produced by the same system which is selectively sensitive to azide.

Sodium iodate, which rapidly destroys the responsiveness to azide, also extinguishes the slow electropositive potentials without affecting the fast reactions associated with retinal excitation at the onset and the cessation of illumination (B- and D-waves). Except for these latter components the electroretinogram undergoes a marked reversal in polarity.

Iodoacetate, however, rapidly removes "on" and "off" effects while the response to azide remains virtually unaffected. We conclude that the slow components are the result of diffusion and ion transport between retina and its outside, whereas the "on" and "off" effects are of direct visual-cell origin.

Evidence for this latter concept is supplied by micro-electrode studies measuring the spatial distribution of B- and D-waves. The implications of these findings for the evaluation of pathologic electroretinograms will be discussed.

DETECTION OF INTRAOCULAR TUMORS USING RADIOACTIVE PHOSPHORUS

Charles I. Thomas, M.D., Jack S. Krohmer, M.S., and John P. Storaasli, M.D.

Because of the limited means of identifying intraocular tumors, it was considered important to utilize the selective localization of certain radioactive isotopes in tumors in order to aid in their diagnosis.

It has been established that various tagged materials are selectively taken up by rapidly proliferating tissue, and that this increased radioactivity can be detected *in vivo* by specialized counting procedures.

Application of this general method to the problem of identification of intraocular tumors is an extension of this method, and was pursued in the present study which included detachments resulting from underlying malignant tumors, detachments due to subretinal fluid, and certain chronic inflammatory lesions.

The method for *in vitro* and *in vivo* counting procedures is given together with a table of cases whereby the establishment of a ratio of tumor to normal tissue (both *in vivo* and *in vitro*) is established.

INVESTIGATION OF CORTICOID MATERIALS IN INTRAOCULAR FLUIDS OF NORMAL AND DISEASED EXPERIMENTAL ANIMAL AND HUMAN EYES

Harry Green, Ph.D., Virginia L. Weimer, Ph.D., and Irving H. Leopold, M.D.

The increasing use of cortisone in treating inflammatory conditions of the anterior section of the eye has prompted this investigation of the corticoid content in the intraocular fluids. It is hoped that these studies will shed some light upon the relationship of the corticosteroids in the intraocular fluids with ocular disturbances and diseases and with general physiologic factors that predispose to the development of such conditions.

The first phase of this investigation was devoted to the detection and quantitative estimation of the corticoids present in the aqueous humor of a normal rabbit eye.

A chloroform-soluble extract of the aqueous was prepared and submitted to the following chemical tests: the zaffaroni sulfuric acid test, the blue tetrazolium test, and the anthrone test.

The responses of the aqueous compared with those of cortisone, desoxycorticosterone, and

other corticosteroids under the same experimental conditions suggest the presence of similar substances. The ultraviolet absorption spectrum of the chloroform extract also suggests this.

Confirmatory evidence for the presence of corticosteroids was obtained by paper chromatography. These results will be discussed.

Irritation of the eye as well as repeated paracenteses of the anterior chamber result in an increase of the corticosteroid content of the aqueous. The action of B-glucuronidase upon the aqueous will be discussed.

STUDIES ON THE NATURE OF THE EXOPHTHALMIC PRODUCING PRINCIPLE OF HYPOPHYSIAL EXTRACTS

George K. Smelser, Ph.D., and V. Ozanics, M.D.

In the present experiments a systematic attempt has been made to determine the role of the several pituitary components in the production of exophthalmos in thyroidectomized guinea pigs.

A preparation of beef anterior pituitary glands was made and its exophthalmos-producing power tested at several dosage levels. The degree of exophthalmos was judged by inspection, measurements of the protrusion of the eyes, weight increase of orbital structures, and their histologic modification. This stock extract was then quantitatively assayed for all of the known hypophyseal principles.

Relatively pure preparations of each of these pituitary hormones were obtained and their potency determined relative to the exophthalmos-producing standard. Each was then tested for its effect on the eye and orbital tissues by injection into thyroidectomized guinea pigs at suitable dose levels. In some experiments these preparations were combined to test the possibility of synergistic action between them.

Similar experiments were done with thyroid-stimulating hormone preparations which differ in method of preparation and animal of origin from the standard preparation.

The evidence obtained to date from these investigations indicates that the exophthalmos-producing action of anterior-pituitary extracts is due to a factor which is either the thyroid-stimulating hormone or an extremely closely related substance.

The relation of the exophthalmos-producing factor and the thyroid-stimulating hormone may be analogous to the ascorbic-acid deplet.

ing and adrenal-hypertrophy factors of ACTH, which are both apparently present in the pure ACTH protein but separate when the protein is degraded to active, though separate, polypeptides.

THIRD SESSION

Wednesday afternoon, June 3rd, at two o'clock
At the: Astor Gallery, Waldorf-Astoria Hotel

THE INFLUENCE OF ACTH ON THE REACTIVITY OF THE CAPILLARY BED IN THE EYE

L. von Sallmann, M.D., B. Pillat, M.D.,
and M. M. Powers, M.S.

The action of corticosteroids on volume changes of the terminal intraocular vascular bed was studied by recording the changes of the eye pressure at a high sensitivity range together with changes in the blood pressure in cats (more than 100 experiments).

In the majority of experiments, the intravenous administration of small amounts of ACTH by slow drip, resulted in a remarkable increase of the pulse and respiratory waves of the eye-pressure curve which became noticeable about five minutes after initiation of the rigidly controlled infusion, and persisted for about one hour.

During this period, the responses to physiologic quantities of adrenergic mediators (adrenalin and nonadrenalin) and to the cholinergic transmitter (acetylcholine) were often drastically increased.

Control experiments did not show similar effects. Experiments carried out with intravenous use of a microcrystalline form of cortisone acetate, of the free microcrystalline alcohol and the commercial cortisone-acetate emulsion, did not show conclusive results.

A NEW METHOD FOR MEASURING BINOCULAR FUSION COMPULSION

Gerhard A. Brecher, M.D., Ph.D.

When fusional compulsion is measured by the prism-vergence test or the haploscope, other factors not related to fusion are involved. These are the degree of forced convergence or divergence and the degree to which the accommodation-convergence reflex is altered. These complicating factors are eliminated by retaining normal binocular stimuli of everyday vision, and merely varying the time element of stimulation presentation.

The contours of a well-illuminated room are continuously presented to one eye, while the same visual field is presented to the other intermittently by occluding it with a photographic shutter and exposing it for 20 milliseconds at intervals varying from 0.20 to 20 seconds.

Binocular fusion was obtained by all but three of 106 subjects (unselected group of medical students) at a stimulation of five per second. All subjects failed to fuse when the interval between the stimuli was longer than 20 seconds. The fusion time measured is taken as an index of the compulsion for binocular fusion.

Three groups of subjects are distinguished: slow fusers, "normal" fusers, and subjects reporting fusion with the interval between the first and second exposure. In the latter group only the sensory component of the fusion reflex seems to be measurable, their phoria being so small that the double images may fall within the limits of the Panum area.

There is a correlation of fusion time and phoria in as much as the third group has the smallest average phorias, the "normal" fusers have a greater phoria, and the slow-fusing subjects have the greatest phorias.

THE EFFECT OF OXYGEN GLUCOSE AND GLUTAMIC ACID ON THE REVERSIBLE CATION SHIFT OF THE LENS

John E. Harris, M.D., James D. Hauschildt, Ph.D., and Loretta T. Nordquist, B.A.

When the isolated rabbit lens is refrigerated, it loses potassium and gains sodium, the concentration of these cations within the lens approaching that of the bathing medium. This shift can be reversed under appropriate conditions by the simple expedient of raising the temperature to 37°C.; then potassium reenters, and sodium leaves the lens, the movement of each ion being against a concentration gradient. Thus, one of the consistent chemical alterations which accompanies cataract formation, is capable of being reversed.

This reversal of the cold-induced cation shift is a measure of energy utilization by the lens. It provides an excellent laboratory tool for the study of lenticular metabolism, the metabolic failures which lead to cataract formation, and the potential of various agents to reverse a chemical change known to occur in cataract development.

The investigations reported here are concerned with the effect of oxygen, glucose, and glutamic acid on the reversal of this cold-induced cation shift. The techniques employed have been described previously.

Under anaerobic conditions, the ability of the refrigerated lens to reestablish normal potassium and sodium relationships when incubated at 37°C. was found to be reduced, particularly in the presence of glutamic acid. Whether the respiration of the lens contributes significantly to its energy production has been the subject of some dispute. The results here reported indicate it does.

No reversal of the cation shift occurred when the lens was incubated in a glucose-free medium; hence, glucose appears to be essential for the cation active transfer. On the other hand, high glucose concentrations reduced but did not abolish the reversal of the cold-induced cation shift. The importance of these observations to an understanding of the development of diabetic cataract will be discussed.

The ability of the lens to concentrate cations is augmented by glutamic acid. The mechanism is not known. In the current studies, it was found that glutamic acid could not replace glucose; however, this amino acid did lessen the deleterious effect of high glucose levels.

Neither alpha-ketoglutaric acid, glutamine, aspartic acid, nor asparagine were able to duplicate the stimulating effect of glutamic acid on the cation reversal. Addition of ATP to media with and without glutamic acid reduced the ability of the lens to concentrate the cations.

EFFECTS OF INTRACAROTID INJECTION OF A BASIC DYE ON THE CILIARY BODY

Elmer J. Ballintine, M.D., and Lawrence Peters, Ph.D., M.D.

A number of nephrotoxic cyanine and styryl-quinoline dyes have been found to act as inhibitors of cellular metabolism. The inhibitory effect of high concentrations of a number of these compounds on the respiration of a renal mitochondrial preparation is reversed by addition of cresyl blue, suggesting the cytochrome system as the site of inhibition. Lower concentrations which have less inhibitory effect on respiration have been found to inhibit the synthesis of organic phosphate in a similar mitochondrial system.

Injection of one of these dyes, N-[2-(p-diethylaminostyryl)-6-methylquinoline] ethochloride (No. 350), into the common carotid

artery of rabbits, during occlusion of the external carotid, results in concentration of the dye in the epithelium of the ciliary body and other epithelial structures in the eye, depression of intraocular pressure, inhibition of respiration of the ciliary body, and a decrease in concentration of aqueous ascorbic acid, on the injected side, without obvious effects on the histologic structure of the ciliary body.

These disturbed functions return to normal over a period of several weeks but at different times: the respiration becoming normal after several days, the intraocular pressure after about two weeks, and the aqueous ascorbic acid remaining depressed for a longer period. Observations are being extended to include the effects on aqueous CO₂ and the effects of related inhibitory dyes on aqueous-humor secretion.

THE COMPOSITION OF THE POLYSACCHARIDE OF THE BOVINE LENS CAPSULE AND ITS TOPICAL DISTRIBUTION

Z. Dische, M.D., and E. Borenfreund, M.S.

The composition and the amount of the polysaccharide of the lens capsule were determined on batches of seven to 10 lens capsules from fresh ox eyes. The capsules were extracted with five-percent trichloroacetic acid to remove all acid-soluble substances, the precipitate twice washed with trichloroacetic acid, and then dissolved in half normal NaOH. The hexoses in the polysaccharide were tentatively identified and quantitatively determined by three color reactions with cysteine and H₂SO₄ and by paper partition chromatography. The presence of other sugars was tested with specific color reactions.

The amount of the total capsule was found to be about one percent by wet weight and about 10 percent by weight of protein. It contained only two sugars in significant amounts, namely galactose and glucose, the ratio of the first to the second being 1.4 ± 10 percent. The polysaccharide could be extracted without significant change in composition with five-percent trichloroacetic acid at 90 degrees.

This extract, after removal of trichloroacetic acid and appropriate concentration, was used for paper chromatography according to Chargaff. Two separate spots corresponding exactly to spots given by glucose and galactose were obtained, the spot for galactose was more intensely colored than that for glucose.

Determinations of total amount of the polysaccharide in the equatorial and central part

of the anterior capsule showed that the first contained one fourth to one third less of the polysaccharide by wet weight than the second one. The content of the protein of the equatorial part in polysaccharide was also lower. In the posterior capsule the average values by wet weight did not differ significantly from the average values in the total anterior capsule. The possible significance of these facts for the pathogenesis of certain forms of cataract is discussed.

FOURTH SESSION

Thursday afternoon, June 4th, at two o'clock
At the: Astor Gallery, Waldorf-Astoria Hotel

THE NUTRITIONAL SUPPLY OF CORNEAL REGIONS IN EXPERIMENTAL ANIMALS: III. FURTHER STUDIES ON THE CORNEAL TRANSPORT OF IN- ORGANIC IONS

Albert M. Potts, M.D., Doris Goodman,
B.S., and Lorand V. Johnson, M.D.

Previous work on the behavior of radioactively labeled inorganic ions injected into the cornea or the anterior chamber or applied to the corneal surface has been extended to eyes intentionally damaged.

Removal of epithelium and partial damage of endothelium, or both, still does not prevent the preponderant outflow of inorganic ions into the aqueous. Even allowing large volumes of fluid to flow over the denuded anterior surface modifies this finding only slightly.

This combined with previous results requires modification of present concepts of the corneal dehydration mechanism.

THE ROLE OF METABOLISM IN THE HYDRATION OF ISOLATED BOVINE LENS AND CORNEA

Bernard Schwartz, M.D., Betty Danes,
Ph.D., and P. J. Leinfelder, M.D.

A constant water content of lens and cornea is necessary for the maintenance of their transparency. It has been questioned recently whether purely passive mechanisms, such as osmotic equilibria, regulate this water content. Changes in cellular water are associated with shifts in normal intracellular and extracellular cation distributions. Evidence for an active metabolic process controlling this cation distribution has been reviewed recently by Ussing.

To show that a maintenance of constant water content in lens and cornea is the result of an active energy-consuming process, the

weight gain of isolated bovine lens and cornea was investigated in isotonic buffered solutions under varied conditions.

Isotonicity, sterility, and a physiologic pH were maintained throughout the experimental period. Initial and final weights of the tissues were measured, as well as initial and final pH and glucose levels of the solutions.

To compare the effect of available substrate, lens and cornea were placed in glucose and nonglucose saline buffered solutions and incubated at 37.5°C. for 24 to 72 hours. Similarly the effect of temperature was determined on weight gain in glucose solutions at 5.0°C., 25°C., and 37.5°C. The importance of oxygen on this process was studied by incubating lens and cornea in similar glucose solutions under atmospheres of five-percent oxygen and 95-percent nitrogen, 100-percent nitrogen, and air.

Results indicate that the water content of lens and cornea is maintained by an active metabolic process.

EXPERIMENTAL GRANULOMATOUS UVEITIS: STUDIES ON THE MECHANISM OF THE CONTRA- LATERAL REACTION AFTER THE USE OF HORSE SERUM IN RABBITS

T. F. Schlaegel, M.D., Fred M. Wilson,
M.D., and Jack Tadman, M.S.

The results of our experiments indicate that a few days after a small injection of horse serum into one eye of a rabbit, none of this antigen could be found in the blood or contralateral aqueous. In a few days, circulating anti-horse-serum antibodies began to appear, first in the blood and then in the contralateral aqueous. The titer continued to rise.

When a large intravenous dose of horse serum was given at three weeks, there followed a marked reduction of antibodies in the blood and a complete depletion of antibodies in the contralateral aqueous. Concurrent with this fall in antibody titer a bilateral granulomatous uveitis developed and reached a maximum on the fifth day.

No organ specificity could be shown, since intradermal sensitization was as effective as the intraocular route in provoking the final uveal reaction.

The intravenous passive transfer of anti-horse-serum antibodies, followed by an injection of horse serum, resulted in a uveitis equivalent to that produced by active sensitization.

The importance of any toxic action of horse

serum was discredited when rabbits given large amounts intravenously developed a uveal reaction only after considerable delay—presumably dependent upon antibody formation since it reached a maximum at about the 14th day.

The body of evidence, both past and present, supports the role of systemic antibodies in the production of uveitis from horse serum.

TREATMENT OF EXPERIMENTAL OCULAR TUBERCULOSIS WITH ISONIAZID

Philip Knapp, M.D., and Ludwig von Sallmann, M.D.

Eighty normal rabbits, involving 110 eyes, were inoculated into the anterior chamber with approximately 50,000 viable virulent tubercle bacilli of a seven- to 10-day culture of H37 Ru Strain. Twenty percent, used as controls, uniformly developed a destructive conglomerate tuberculosis of the eye. Forty percent were treated immediately with Isoniazid subcutaneously in dosage of 10 mg. per kilo body weight, daily. In 40 percent treatment was delayed until a full-blown ocular inflammation had developed.

Treatment was carried on for five months with quite promising clinical response. The rabbits are killed at two-month intervals and, although the histologic and bacteriologic examinations have not been completed, the results to date are promising.

HEALING OF THE POSTERIOR LENS CAPSULE AND LENS INDUCED ENDOPHTHALMITIS: AN EXPERIMENTAL STUDY

Wood Lyda, M.D., Richey L. Waugh, Jr., M.D., and George M. Haik, M.D.

This experiment was undertaken to study the healing process of the posterior lens capsule and the cellular response of the eye to lens material extruded into the vitreous.

The immediate lens response to trans-scleral posterior incision was retraction, thickening, and curling of the posterior lens capsule. By

six hours there was posterior bowing of the equatorial epithelial cells. The lens substance in the area of the incision became disorganized, edematous, and began to extrude into the vitreous cavity.

By six days, extruding lens epithelial cells were found extending into the area of the break. By nine days, the break was covered by these cells. After several weeks, the more anterior of the proliferating cells reverted to the more mature cuboidal form. There was apparently no secretion of a new capsule.

The immediate cellular response was one of round cells and macrophages from the pars plana and ciliary processes into the vitreous and along the zonular fibers toward the lens.

By 12 hours, there was a polymorphonuclear-cell response with extension into the lens substance. After 24 hours, the retinal vessels were markedly dilated and there was outpouring of mononuclear cells and macrophages. A fibrous tissue membrane had formed from the ciliary body toward, but distinct from, the lens epithelial cells. The cell response had decreased to a minimum after five days.

EXTRAMEDULLARY HEMATOPOIESIS IN AND AROUND THE EYE

Algernon B. Reese, M.D., and Frederick C. Blodi, M.D.

In the course of our study of retrolental fibroplasia, we examined microscopic preparations of 122 sets of eyes of still-born or newborn infants (*The pathology of early retrolental fibroplasia*, Am. J. Ophth. 35:1407-1426 (Oct.) 1952).

In 14 percent of the eyes we noted a cellular infiltration in the choroid, vitreous, and orbit which at first we thought was chronic inflammation. Further study reveals that these cells represent extramedullary hematopoiesis.

This paper deals with a description of our findings, their relation to certain reports in the literature, and their possible clinical significance.

PROGRAM
of the
SECTION ON OPHTHALMOLOGY
American Medical Association

JUNE 1 THROUGH 4, 1953
NEW YORK, NEW YORK

FIRST SESSION

Tuesday morning, June 2, 1953

At the: Astor Gallery, Waldorf-Astoria Hotel
CHAIRMAN'S ADDRESS

Francis H. Adler, Philadelphia, Pennsylvania.

THE SCLERAL RESECTION OPERATION FOR RETINAL DETACHMENT: AN EVALUATION OF THE RESULTS

Peter C. Kronfeld, Chicago, Illinois;
Dohrmann K. Pischel, San Francisco, California

The report deals with 200 consecutive scleral resection operations performed by us on cases of idiopathic or posttraumatic retinal detachment which were considered unsuited for diathermy operation. Thirty-one percent of the operations were successful in bringing about lasting, complete reattachment of the retina; nine percent of the operations were partly successful in that they resulted in reattachment of at least one quadrant and that the retina became stabilized in that position; sixty percent of the operations were failures.

An analysis of this series was made with regard to the following principal points: (1) The postoperative course, as compared with that after diathermy operations; (2) the final anatomic functional status of the operated eye; and (3) the probable mode of action of the operation.

The postoperative course is characteristically slow, the final position of the retina often not being attained until several months after the operation. In the successful cases the choroidal and the retinal bulge caused by the operation gradually subside, in some cases at the same rate, in other cases at different rates. Signs of meridional stress may be seen to disappear and starfolds to flatten out.

Close postoperative ophthalmoscopic obser-

vation may permit the recognition of a distinctly favorable response to the scleral resection operation in some cases and, unfortunately, the complete lack of such a response on other cases. Thus the specificity of the operation is confirmed.

Anatomic and functional gains made during the postoperative period tend to be lasting.

In the successful cases the final, anatomic and functional status of the operated eye is surprisingly close to normal, with regard to the shape of the eyeball, curvature of the cornea, and position of the retina.

Our observations suggest that the scleral resection operation only in a very limited sense functions as a barrage operation; its chief value lies in that it corrects a size discrepancy between retina and scleral envelope.

A COMPARISON OF SCLERAL RESECTION AND SCLERAL FOLDING IN THE EXPERIMENTAL SHORTENING OF THE EYE

Angelos N. Dellaporta, Buffalo, New York

The scleral resection was performed on 26 normal dogs' eyes according to the method of Lindner, the scleral folding (lamellar scleral resection) on 12 normal dogs' eyes according to my own method.

Ophthalmoscopically, a band-shaped protrusion of the retina and choroid is evident at once in both operations. The choroid recedes in three or four days, the retina in eight to 10 days.

Healing of the scleral wound is accomplished in three weeks in both operations. The fold of the scleral lamella seen after scleral folding flattens out in about 10 days. So, after that time, there is little difference histologically between the two operations.

After scleral resection, marked inflammatory changes were seen around the wound in the sclera and especially in the choroid, but very few of such changes after scleral fold-

ing. The adhesion of the retina to the choroid is more rapid and firmer in scleral resection.

Because in human eyes the sclera is thicker and relatively free of blood vessels, scleral folding is more easily accomplished than in dogs' eyes. According to the histologic findings, the mechanical shortening of the eye is the same after both operations. Scleral resection produces quicker and stronger adhesion of the retina but scleral folding plus artificial inflammation of the choroid by chemicals or diathermy coagulation should be as efficient as scleral resection.

THE USE OF P32 DIAGNOSTICALLY IN OCULAR PATHOLOGY

Isadore J. Eisenberg, Philadelphia, Pennsylvania; Irving H. Leopold, Philadelphia, Pennsylvania; David M. Sklaroff, Philadelphia, Pennsylvania

Over 35 eyes have been tested with radioactive phosphorus prior to enucleation. P32 has radioactive characteristics which make it suitable for use in ocular experimentation, such as, ease of handling and detection, and a large safety factor for the patient.

Studies were run to determine the variations in the concentrations of radioactive phosphorus in normal eyes, and whether a significant concentration of P32 could be detected in pathologic eyes. Also investigated were the concentrations of P32 in various types of pathology, and its localizing value, in the hope of developing a technique which will allow us to evaluate this compound in the detection of intraocular growths and their accurate localization.

The technique employed in these studies was the injection of sodium acid phosphate containing 500 microcuries of radioactive phosphorus. This was injected intravenously after a time interval between 30 minutes and an hour and a half. A count was taken over the skin of the lobe of the ear, recorded as the number of discharges per minute.

The eye is marked out in four quadrants, and each quadrant is numbered in a clockwise direction. A count for one minute is taken over each quadrant both in a normal eye and a pathologic eye. The applicator counter is placed near the limbus and as closely as possible to the lesion as visualized with the ophthalmoscope. At the end of the test, another count is taken at the lobe of the ear.

Tentative conclusions can be made from the study to date:

1. Statistical analysis (determination of sigma and using 3.5 sigma as a critical value in this small series of cases) establishes the fact that there is a definite trend in variation of P32 concentration in the abnormal as compared to the normal eye.

2. Neoplasms in anterior half of globe show definite evidence of increase in concentration.

3. Neoplasms in the extreme posterior segment of globe (unless very active) show little or no evidence of concentration of P32 with our technique.

4. Inflammatory lesions also show positive evidence of increase in concentration of P32.

5. Serous detachments show no increase in concentration of P32.

6. The variation of the high count as compared to the average may be as much as 28 percent in the normal eye but further studies and better analysis of the accumulated data may alter these figures.

OCULAR DYSMETRIA, FLUTTERLIKE OSCILLATIONS OF THE EYES AND OPSOCLONUS

David G. Cogan, Boston, Massachusetts

Ocular dysmetria, characterized by overshoot of the eyes on attempted fixation, and flutterlike oscillations of the eyes characterized by episodic cycles of pendular movements with or without changes in fixation are significant signs of cerebellar disease. They may show overlapping in one and the same patient. It may accordingly be inferred that the cerebellum normally operates in the arrest of fixational movements and in the maintenance of gaze. The entity of opsoclonus is distinct from ocular dysmetria and flutterlike oscillations and not necessarily indicative of cerebellar disease.

XEROPHTHALMIA

Daniel G. Vaughan, Jr., San Jose, California

Three cases of xerophthalmia, an almost forgotten ocular disease in the United States, occurred in infants at the University of California in a three-year period. Two of the three resulted from an anti-allergic diet; the third followed a congenital bile-duct obstruction. In each case recognition of the characteristic eye lesions led to early diagnosis and to the successful treatment of the avitaminosis.

In addition, two adult cases of vitamin-A deficiency resulting from low vitamin intake

in chronic alcoholism were recognized from the presence of Bitot spots.

The eye changes seen in these five cases are considered in detail and are compared with the findings recorded in the literature. Specially emphasized are the biomicroscopic findings in early cases and the supplementary value of the cytologic changes seen in epithelial scrapings from the bulbar conjunctiva.

These clinical and cytological findings are illustrated with photographs and drawings in color and are correlated with other laboratory data, including vitamin-A blood-level determinations.

The problem of vitamin deficiencies in the United States is surveyed and the various factors which might lead to avitaminosis A, such as alcoholism and special diets for the relief of allergy, obesity, and so forth, are considered. In this connection, the potential danger to the eye from the use of mineral oil in constipation is also analyzed.

The eye changes in the three infant cases responded readily to treatment; the two adult cases, in which the changes were less severe, were only slowly responsive. The problems of therapy are reviewed in the light of these cases.

DACRYOCYSTOGRAPHY: THE NORMAL LACRIMAL TRACT

Byron H. Demorest, Saint Louis, Missouri
Benjamin Milder, Saint Louis, Missouri

It has been a half century since X-ray visualization of the lacrimal tract was first suggested. Since that time, the literature has been fragmentary, and actually few papers have added to our knowledge of the subject.

The purpose of this study was twofold. First, there was a need to establish radiographic criteria for the normal lacrimal tract, and thus aid in interpreting abnormal findings. Second, it was felt necessary to emphasize the importance of this procedure to the ophthalmologist and the radiologist.

A simple economical method of tear-sac injection and radiography is presented. Our injection technique is described, and the salient features of the method are discussed. The X-ray projections used and the number and sequence of these films are listed. Reasons for the selections of definite X-ray projections are enumerated, and the elapsed time between these pictures is given. Stress is laid on the importance of a follow-up film, and the optimum time for this film is given.

A detailed report is made on the important

aspects of the interpretation and evaluation of the dacryocystogram. There is a wide variation in the appearance of the normal outline of the lacrimal passages viewed in this series; however, the general configuration is shown, and compared to the normal gross anatomy. In the actual interpretation of these films by the clinician, no attempt should be made to draw many conclusions regarding the anatomy of the tear passages. Rather, it is important to stress that the chief purpose of this procedure is to determine the function of the lacrimal system. The relative filling of the sac and duct with pantopaque, the position of the dye when viewed on the film, and the ultimate emptying time, is shown on the follow-up film; all aid in evaluating the function of the system.

SECOND SESSION

Wednesday morning, June 3, 1953

At the: Astor Gallery, Waldorf-Astoria Hotel

ADDRESS BY THE GUEST-OF-HONOR

Professor Franceschetti, Geneva, Switzerland

UVEITIS IN CHILDREN

Phillips Thygeson, San Jose, California;
Michael J. Hogan, San Francisco, California;
Samuel J. Kimura, San Francisco, California

The various types of uveitis seen in children are analyzed. Some 40 cases were studied in the uveitis survey project being conducted at the University of California, Department of Ophthalmology and the Francis I. Proctor Foundation for Research in Ophthalmology. Congenital and acquired toxoplasma infections are discussed. The literature has been reviewed.

UVEITIS: A MILITARY PROBLEM

Major John R. Fair (MC)

Uveitis is a major cause of ocular disability in the Armed Forces and is especially costly because of the long hospitalizations involved. The causes of uveitis are many, and it is believed that the disease will be overcome only step by step as one after another of the etiologic factors is discovered. In the past year ocular toxoplasmosis and leptospirosis have been investigated at Walter Reed Army Hos-

pital. These diseases are certainly causative in some cases and demand continued study.

A CLINICAL REPORT OF THE USE OF THREE NEW CYCLOPLEGIC DRUGS

Bernard C. Gettes, Philadelphia, Pennsylvania

Three new cycloplegic drugs were tested clinically. These are the one-percent solutions of Compound GT-75 (Cyclogyl), GT-92, and GT-93.

For a routine refraction, one instillation of any of these drugs produces adequate cycloplegia within one hour.

Residual accommodation is less than 2.5 diopters with all three drugs in over 96 percent of the patients. The depth of cycloplegia compares quite favorably with atropine.

These drugs have been tested clinically for refraction in a few hundred patients, and none have exhibited any toxic reactions, locally or systemically.

Cycloplegia is of relatively short duration, since all patients could resume their usual habits in 12 to 24 hours.

These drugs have, likewise, been used in individuals sensitive to atropine and scopolamine with no toxic reaction.

In children, instead of using atropine for three days, two instillations of these drugs appear quite adequate.

I recommend the use of these compounds for refraction for the following reasons:

1. Cycloplegia is more consistent than with homatropine.
2. Recovery from cycloplegia is fast enough to permit no loss of time from work or school, other than the actual day of examination.
3. No toxic effects, local or systemic, have been noted.

VERY EARLY VASCULAR SIGNS IN THE RETINA IN RELATION TO ELEVATED DIASTOLIC BLOOD PRESSURE

Henry Minsky, New York, New York

By paying attention to certain minimal changes in the retinal arterioles, it is possible for the general practitioner, as well as the ophthalmologist, to obtain clues which will permit him to estimate within reasonable limits the established level of the diastolic pressure even though an intercurrent shocklike state, such as coronary occlusion might result in misleading low-pressure readings.

These minimal changes were determined in a pilot study of 100 mixed cases (hypertensive and nonhypertensive) made by a method which insured objectivity. Several new terms better to describe these minimal changes are suggested: distal or proximal tapering of an arteriole or its fork (divisions) and disproportionate branching.

THIRD SESSION

Thursday morning, June 4, 1953

At the: Astor Gallery, Waldorf-Astoria Hotel
DORACAINE FOR RAPID ANESTHESIA OF THE CORNEA

Henry E. Schlegel, Jr., Portland, Oregon;
Kenneth C. Swan, Portland, Oregon

One of us has demonstrated that topical effectiveness on the cornea of a given anesthetic drug is determined by its penetrability into the epithelium, as well as by its anesthetic potency. It has been a purpose of our investigations to find a rapidly penetrating, non-irritating compound which would induce a short, intense period of corneal anesthesia, without altering the pupillary or accommodative mechanisms or producing epithelial damage.

Such a drug would have great usefulness in the office practice of ophthalmology, as well as in certain types of ophthalmic surgery. A potent new benzoic-acid ester, doracaine, has been found to meet these requirements. It is the diethylamino-ethyl ester of p-amino-m-butoxybenzoic acid.

Doracaine was synthesized and first studied in Switzerland. Its clinical effects have been investigated more extensively in the Eye Clinic of the University of Oregon Medical School. Also data on its corneal penetration and distribution have been determined in animals by chemical analyses and compared to similar studies made with other anesthetics. Clinical applications of the various drugs are discussed.

A PRELIMINARY REPORT ON THE RIDLEY OPERATION

Warren S. Reese, Philadelphia, Pennsylvania;
Turgut N. Hamdi, Philadelphia, Pennsylvania

The disadvantages of aphakia following cataract extraction are briefly discussed.

The operative technique used is described.

A summary of the results obtained in approximately 20 operations performed between March, 1952, and May, 1953, is presented.

CONTACT LENSES IN APHAKIA

Elizabeth F. Constantine, New York, New York; John M. McLean, New York, New York

Because of recent extensive interest in intra-ocular plastic implants after cataract removal, it seems timely to give a preliminary report on the use of contact lenses in aphakia.

A series of about 40 cases will be presented. Over 30 are cases of monocular aphakia, the majority having a normal or nearly normal second eye.

Problems of fusion are discussed. In efforts to restore fusion, use has been made of both temporary occlusion of the unoperated eye and of temporary prisms. The possibility of establishing binocular vision by use of a contact lens is offered as a substitute for an intra-ocular lens.

The relative advantages and disadvantages of contact lenses as opposed to spectacle lenses in aphakia are considered. A brief discussion of various types of contact lenses in current use and their adaptability to specific cases will be included.

ISONICOTINIC ACID HYDRAZIDE IN OPHTHALMOLOGY

Theodore F. Schlaegel, Jr., Indianapolis, Indiana; Louis N. Hungerford, Indianapolis, Indiana

Isonicotinic acid hydrazide, a promising antituberculosis drug, is being evaluated as a possible therapeutic agent in granulomatous uveitis, especially that of tuberculosis origin.

The results of animal experiments and human aqueous studies on the penetration of isonicotinic acid hydrazide into the anterior chamber will be reported. Preliminary tests indicated a ready passage across the blood-aqueous barrier.

This drug was used in human cases of granulomatous uveitis and the degree of favorable response appeared to follow the likelihood of tuberculous etiology. Toxicity appeared to be low.

FIBRIN FILM IN THE TREATMENT OF CORNEAL DISEASES

C. William Weisser, Pittsburgh, Pennsylvania

The most important factors in corneal injuries are relief of pain and regeneration of epithelium. Many agents are used for relief of pain but delay healing, and those which might stimulate healing, increase pain.

Thrombin-plasma (fibrin film, tissue glue) has apparently not been used heretofore for the purposes just outlined.

When instilled in an injured eye, one drop of thrombin and one of plasma form a tenacious clot which almost invariably brings prompt relief of pain and which undoubtedly permits more rapid covering of the injured area by firm epithelial cells.

The paper will outline the use of fibrin film in about 100 cases of corneal injuries, including abrasions, foreign bodies, lacerations, and burns, as well as chronic keratitis and corneal ulcers.

The outline will include the duration of the disease, the rapidity of healing, the duration of pain, and the initial and resultant vision. Some of the typical cases will be discussed in detail and some of the failures elaborated upon.

In conclusion, this substance, when properly used, may be of great value in the treatment of many corneal conditions, and be of greater service than any agent now used. The substance has been used alone and with incorporated anesthetic and antibiotic medications.

EXPERIENCES WITH A MAGNETIC IMPLANT FOR COSMETIC IMPROVEMENT OF THE ENUCLEATION PROCEDURE OVER A FIVE-YEAR PERIOD

Richard C. Troutman, New York, New York

In May, 1948, the first magnetic implant was placed in a human patient at the New York hospital, Cornell Medical Center. Since that date I and my associates at Cornell Medical Center and Manhattan Eye, Ear and Throat Hospital have placed more than 300 magnetic implants.

Statistical results of the implant procedure will be presented, the indications for the use of the magnetic implant will be discussed, and a simplified operative technique will be shown.

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THE HYPODERMIC SYRINGE: A BY-PRODUCT OF OPHTHALMOLOGY

The contributions of ophthalmologists to fundamental advances in the art and science of medicine have yet to be fully accounted. John Reissberg Wolfe suggested the transplantation of skin-flaps without pedicle in 1883; Carl Koller demonstrated the anesthetic action of cocaine in 1884; and Ludwig Mauthner in 1890 conceived the now accepted explanation of the sleep mechanism.

The hypodermic syringe, designed by

Pravaz just 100 years ago and still called by his name in continental Europe, was an inspired variation of Anel's lachrymal syringe invented in 1716. Previously, in 1839, Dr. Taylor and Dr. Washington of New York had used the Anel syringe for a crude parenteral administration of morphine by forcing the nozzle through a small skin incision.

Dominique Anel (1678-1725), a pupil of

Jean-Louis Petit, was born in Toulouse and, after a varied career, settled in Paris where he limited his practice to ophthalmology. The original Anel syringe of sterling silver had a leather piston and a fine elongated nozzle for insertion in the lacrimal punctum. This syringe is the parent also of the anterior-chamber irrigator. In 1722, St. Yves used the Anel syringe through a limbal incision for daily irrigation of the anterior chamber in stubborn cases of hypopyon. Special adaptations were later made by Dimmer, Panas, Lagrange, Gibson, Dougherty, McCune-Elliott, Bishop Harman and others.

Charles-Gabriel Pravaz of Lyons reported one of the earliest studies of hemianopsia (*Arch. gén. de Méd.*, 9:485, 1825). In later experiments on the cure of aneurysm, he introduced to modern therapy both galvanocautery and the hypodermic syringe. As the syringe was patterned primarily for the application of ferric chloride to nevi and aneurysms (*Compt. rend. Acad. d. sc. Paris*, 36:88-90, 1853), it was provided with an external nut working on a thread cut about the piston so that the contained liquid could be extruded drop by drop. Another novel item was a separate needle with a slip joint, the needle being of steel and the hub of hard rubber.

Alexander Wood (1817-1884) extended the use of the hypodermic syringe to the administration of drugs (*Edinburgh M. & Sc. J.*, 82:265-81, 1855). Morphine chloride, isolated by Sertürner in 1806, was thus given in 12 cases of intractable neuralgia, in all of which a remarkable rapidity of effect was demonstrated. He ascribed correctly great absorbent power to the cellular tissue, and concluded that subcutaneous injections offer "a means of introducing medicinal agents very rapidly into the body in a situation where they will not be readily decomposed. . . . That in all probability what is true in regard to narcotics would be found to be equally true, in regard to other classes of remedies."

"Yet they, believe me, who await
No gifts from chance, have conquered Fate."

The poems from which these lines came were published in 1853, but Matthew Arnold seems only yesterday, while the 100 years since the advent of the Pravaz syringe seem long indeed. A literary masterpiece remains just that, but a significant scientific invention starts a chain reaction.

By 1856, the hypodermic syringe was made in America. In 1859, Dr. Charles Hunter of London improved the cutting point on the needle. In 1878, tablet triturates for hypodermic use were introduced by Fuller of Philadelphia. Koch originated the tuberculin syringe in 1888, and a Boston firm produced the first all-metal syringe with a "ground-in" piston in 1894.

Schleich, while working with cocaine infiltration for local anesthesia, developed the bayonet method of attaching the needle in 1895. In 1896, came the all-glass syringe from the firm of H. Wulffing Luer of Paris which has now practically displaced all other types in the United States. The Record syringe, which consists of a metal plunger and glass barrel ground to a snug fit was invented in 1906 and is still popular in Europe.

In 1911, Dr. James T. Greeley of Nashua, New Hampshire, devised the "syrette" variation so widely used by our Armed Forces in World War II; and the carpule syringe was launched in 1917. Thanks to Dr. R. H. Riethmueller of Philadelphia, the security bead was available in 1918 to lessen the danger of losing a broken needle in tissue.

In World War I, a rustless steel was perfected in Germany which was rust-resisting throughout, kept the point well and had unusual resistance to breakage. Improvement of syringes followed that of needles and, since 1924, they have been made of alkali-free hard glass, such as Pyrex. Such syringes can be placed in boiling water without fear of breakage and are not easily eroded by sterilization or medicaments.

The Luer-Lok which was introduced in 1925 requires only a half turn for the needle to be fastened securely or released. The injector, invented by Dr. Herbert Busher of St. Paul, in 1932, permits the automatic insertion of the needle at the proper depth and angle. This device facilitates hypodermic administration in nervous patients and children and makes hypodermic self-administration practically painless.

The collection of blood specimens by vacuum eliminates hemolysis caused by a moist syringe or by pressure during ejection from the syringe. A nonhemolyzed specimen is essential for many laboratory tests including the detection of toxoplasmosis. For this purpose the Keidel tube or its improved modification, the Vacutainer, is furnished with a choice of anticoagulants.

Since 1945, continuous injections of all types have been facilitated by the use of plastic tubing for which special thin-walled needles have been made. The latest innovation is the production of all-glass syringes with pistons and barrels interchangeable.

Precise knowledge concerning sterilization and contamination of syringes is still insufficiently disseminated. Bacteria survive in syringes and needles that are washed and simply passed through a disinfecting solution. Spores are resistant to short periods of boiling; continued boiling for 30 minutes is effective but only if the syringes and needles have been thoroughly cleansed previously.

Preferable is the autoclave (15 pounds pressure at 250°F. for 20 minutes) or the hot-air oven (one hour at 320°F.).

Tuberculin adheres tenaciously to glass and sensitive subjects have reacted to isotonic saline from sterilized syringes previously used for tuberculin injections. When oily solutions are used, the syringe must be cleansed immediately with effective solvents. In the mass administration of arsenotherapy, penicillin, insulin, and tetanus-toxoid the time-saving multiple dose per syringe technique (separate needle, common syringe) has effected the transmission of syphilis, malaria,

and virus hepatitis. The suction induced while withdrawing the syringe from the needle draws fluid from the point of the needle to the syringe nozzle and contamination follows.

James E. Lebensohn.

OBITUARY

JOHN A. MACMILLAN
(1885-1953).

Dr. J. A. MacMillan, one of Canada's most distinguished ophthalmologists, died in the early morning of February 6, 1953. He had not been well for some time, having suffered a coronary occlusion in August, 1950, followed by several recurrences. His final illness was mercifully short.

John Alexander MacMillan was born on May 22, 1885, in Finch, Ontario, a small town in a large Scottish-Loyalist community, situated some hundred miles west of Montreal and south of the Ottawa River. He was the son of James and Mary Cameron MacMillan.

His early education was obtained at Finch Public School and at Cornwall High School. He was graduated from McGill in 1906 with the degrees of M.D., C.M. Following an internship at the Royal Victoria Hospital in 1908, he entered upon his specialized training at the Manhattan Eye and Ear Infirmary, first in otolaryngology and later in ophthalmology. The years 1911-12 were spent in postgraduate study in Jena, Vienna, and London.

In 1913 he returned to Montreal to undertake private practice in ophthalmology, and joined the staff of the Royal Victoria Hospital, at which date he also was appointed assistant demonstrator at McGill University. In the succeeding years he steadily advanced in his appointments at both McGill University and the Royal Victoria Hospital until 1940, when he became ophthalmologist-in-chief at the latter institution. In 1941 he

was appointed professor and chairman of the Department of Ophthalmology at McGill University.

For many years he served as consultant at the Jewish Memorial Hospital in Montreal, and at the Physician's Hospital in Plattsburg, New York.

In 1914, Dr. MacMillan joined the Royal Army Medical Corps and served in France from 1915-1918, in Canadian General Hospital #3. From 1918 to 1919 he served as consultant in ophthalmology to the Canadian Corps overseas.

In 1920 he returned to private practice in Montreal, and was elected a fellow of the American College of Surgeons. He obtained the diploma of the American Board of Ophthalmology in 1928, and in the same year became a fellow of the American Academy of Ophthalmology and Otolaryngology. In 1931 he was elected a member of the American Ophthalmological Society. He took an active part in this society, serving on committees and being chairman of its council (1949-50).

He also served at one time as secretary and later as president of the Montreal Ophthalmological Society; as member of council and later as president of the Canadian Ophthalmological Society (1946-47); as president of the Montreal Medico-Chirurgical Society (1945-46); as chairman of the Section of Ophthalmology of the Canadian Medical Association, and as chairman of the Medical Board of the Royal Victoria Hospital from 1945 to 1948.

From 1945 to 1949, he was a vice president of the Pan-American Association of Ophthalmology. For the same period he served on the advisory board of the American College of Surgeons, and as Canadian representative on the editorial board of the Ophthalmological Foundation in New York.

In 1918, Dr. MacMillan was married to Edith Leslie, a graduate in nursing at the Royal Victoria Hospital, who at that time was serving overseas. This markedly happy union ceased with the death of Mrs. Mac-

Millan on April 20, 1947. Surviving are two daughters, Margaret (Mrs. David F. Kerr) and Marion (Mrs. G. D. Robertson Cooper), two grandsons, and a granddaughter.

This bare account of Dr. MacMillan's life and achievements, though an outstanding record, falls short of giving any true conception of his distinction as a man and an ophthalmologist. Such was the profound effect of his personality upon all he met, and particularly upon his immediate confreres, that it is difficult for one of the latter to write about him without sounding overly idealistic and sentimental.

It can be fairly said that Dr. MacMillan was one of the most distinguished ophthalmologists ever to practice the specialty in Canada. His influence on the trend of ophthalmology in this country has been profound. This is so, because in him were combined to a remarkable degree the qualities of mind and character that go to make a physician.

On first meeting him, patient and confrere alike were captivated by the great charm and magnetism of his manner. Though too complex to be described or analysed fully, the main feature of this was the production of a glowing sense of intimacy in those he met. Its impact did not dim with time or closer acquaintance. He made no secret of his liking for people of all types. This, no doubt, was the wellspring of his charm and his success as a doctor. Indeed, it was the basic principle of his life.

It has been said that art is a means of communicating an emotion. If this be so, medicine to him was not only a science but also it was an art in that it was the means by which he expressed his deep love and compassion for all. The very sincerity of this was plain to see. While motivated by these strong feelings, nonetheless he was the least ostentatious of men. In his gentle way he had no patience with showmanship or conceit.

It was this blending of mysticism and native practicality that was his heritage from



JOHN A. MACMILLAN

his Scottish ancestors—an heritage, by the way, of which he was quietly but deeply proud. These qualities, with his strict ethical code and his pervasive sense of humor, produced a personality that stood out in any company. Thus, to him came leadership. But this leadership was expressed with such reticence and self-effacement that its effect was achieved rather by guidance and example than by domination.

To these great qualities of character he added first-rate mental equipment and a persistent curiosity about natural phenomena. He read widely on medical subjects and had a retentive memory for things read and things experienced. With few exceptions, while in discussion on ophthalmic topics, one found him the best informed person present. Whenever this was not the case, it would be so the next day.

In the ward and clinic he not only brought

this knowledge to bear logically, but he had that never-ending source of wonder—the intuitive clinical and diagnostic sense. His clinical abilities were complemented by his great surgical skill. It was a treat to watch him operate, to see his manual skill applied with assurance and good judgment.

Though his forte was clinical ophthalmology, he was no stranger to the laboratory. He kept well informed on scientific developments in general, but his great interest was in morphologic pathology in which field he made several outstanding contributions. He was a frequent contributor to ophthalmic journals on a wide variety of subjects.

He was a great teacher, rather by precept and contact than by a display of pedagogy on the lecture podium. At the bedside he was superb. In one way and another he taught, or greatly influenced, many oculists in Canada today. His integrity, and his approach to ophthalmology both in the ethical and in the practical sense, has given a direction to ophthalmology in Canada that is not easy to appreciate fully. It is not surprising, then, that his services as a medical adviser and consultant were in tremendous and constant demand. To all he gave of his time and effort in a most prodigal way.

Thus, one may come to understand the source of his great charm and the profound effect he had upon all he met, whether student, confrere, or patient. Such was this beloved and respected man. We all are much poorer for his passing.

John V. V. Nicholls.

XVII INTERNATIONAL CONGRESS OF OPHTHALMOLOGY

The XVII International Congress of Ophthalmology will take place at the Waldorf-Astoria Hotel in New York City, September 12 to 17, 1954. Dr. Bernard Samuels, New York, is president; Dr. John

H. Dunnington, New York, vice president; and Dr. William L. Benedict, Rochester, Minnesota, secretary general. Dr. Derrick Vail, Chicago, is chairman of the executive committee.

The chief topics for discussion are: "Primary glaucoma: Etiology and general considerations," Dr. Derrick Vail, Chicago, U.S.A.; "Medical treatment," Dr. R. Thiel, Frankfurt a. Main, Germany; and "Surgical treatment," Dr. G. P. Sourdille, Nantes, France; and Etiology of uveitis: General considerations," Dr. Alan C. Woods, Baltimore, U.S.A.; "Allergic factors," Dr. Norman Ashton, London, England; "The role of viruses," Dr. V. Cavara, Rome, Italy. A number of voluntary papers by authors on subjects of their own choosing will also be heard.

English, French, and Spanish are the administrative languages of the congress but papers may be read in any language. Original papers should be sent to the secretary general not later than January 1, 1954. As the number of papers submitted may be greater than can be accommodated, the Committee on Scientific Program reserves the right of selection.

A program of motion pictures will be a prominent feature of the congress. The most approved techniques of diagnosis and treatment of ocular diseases will be demonstrated, as well as modern methods of audiovisual instruction by means of electronic instruments of projection, radio, and television. There will be large scientific and technical exhibits in the various assembly rooms of the hotel.

All qualified medical practitioners are eligible to attend the congress. Individuals who are not medical practitioners but who are engaged in scientific work in a field allied with ophthalmology may register as associate scientific members, and relatives and friends of members may attend as associate members.

The schedule of registration fees as determined by the International Council is as

follows: full members from North American countries, \$25.00; from non-North American countries, \$15.00; associate scientific members from North American countries \$10.00; from non-North American countries \$5.00; associate members from North American countries, \$10.00; from non-North American countries \$5.00.

The American Express Company has been appointed official travel agent for the congress and will offer assistance in securing travel accommodations. In order to provide the greatest possible assistance in obtaining hotel accommodations a special Housing Bureau has been established. Arrangements have also been made for low-cost accommodations in the Residence Halls of Columbia University.

William L. Benedict, M.D.
Secretary General
100 First Avenue Building
Rochester, Minnesota

CORRESPONDENCE

KUDOS

Editor,
American Journal of Ophthalmology:

I am writing to inform you, should you not have received any news on the subject, that a recent regulation of the Food and Drug Administration now requires commercial ophthalmic solutions to be sterile and to contain suitable preservatives. Naturally those of us who have been active in the campaign are very happy about this.

Being deeply appreciative of your interest and the wonderful coöperation of the AMERICAN JOURNAL OF OPHTHALMOLOGY in publishing so promptly the communication that brought the matter to the fore, I want to take this opportunity to thank you once again for all you have done. Mr. Robert R. Feinstein, who as you know helped me so much, joins me in this. A year and a half ago, we were told by many that the entire

problem was impossible of solution and that we were wasting our efforts.

Since the JOURNAL was the only publication to take a positive editorial position and thus rendered an important public service, I am enclosing a copy of the regulation in the event that you feel it fitting to comment on it editorially.

Recognition and acknowledgement of what has been accomplished so far, on the part of the leading ophthalmic JOURNAL, would do much to encourage the authorities to go further in regard to the important related problem of eye solutions prepared by retail and hospital pharmacies. Moreover, until that is settled the full benefit of the ruling on commercial solutions will not be achieved unless ophthalmologists are acquainted with the new law so that they may take advantage of it and not unwittingly nullify it in their prescriptions.

(Signed) Frederick H. Theodore, M.D.
New York, New York.

STERILITY OF OPHTHALMIC SOLUTIONS

Pursuant to Section 3 of the Administrative Procedure Act (60 Stat. 237, 238; 5 U.S.C. 1002), the following statement of policy is issued:

3.28 *Notice to manufacturers and repackers of ophthalmic solutions.* (a) Investigations by pharmaceutical manufacturers, physicians, and the Food and Drug Administration have revealed that liquid preparations for ophthalmic use contaminated with viable microorganisms have been responsible for serious eye injuries and, in some cases, complete loss of vision.

The Food and Drug Administration has conducted a survey of medical opinion and has found that it is the consensus of informed persons that such preparations should be sterile. It is evident that liquid preparations offered or intended for ophthalmic use purport to be of such purity and quality as to be suitable for safe use in the eye.

The Federal Security Agency concludes that such preparations fall below their professed standard of purity or quality and may be unsafe for use if they are not sterile. Accordingly, liquid preparations offered or intended for ophthalmic use which are not sterile may be regarded as adulterated within the meaning of section 501 (c) of the Federal Food, Drug, and Cosmetic Act and, further, may be misbranded within the meaning of section 502 (j) of the act.

(b) Liquid ophthalmic preparations packed in multiple-dose containers should (1) contain one or more suitable and harmless substances that will prevent the growth of microorganisms, or should (2) be so packaged as to volume and type of container and so labeled as to duration of use and necessary warnings as will afford adequate protection and minimize the hazard of injury resulting from contamination during use.

(Interprets or applies secs. 501 (c), 502 (f), 502 (j), 52 Stat. 1049, 1050; 21 U.S.C. 351 (c), 352 (f), 352 (j)).

Dated: January 12, 1953.

Rufus E. Miles, Jr.,
Acting Administrator.

(F.R. Doc. 53-478; Filed January 15, 1953; 8:49 a.m.) (Published in Federal Register January 16, 1953; 18 F.R. 351)

DR. GOLDMANN REPLIES

Editor,
American Journal of Ophthalmology:

In the 10th issue of Volume 35, page 1512, you published a letter by Ascher, with regard to which I should like to make the following statements.

I never challenged the priority of Ascher's discovery of the aqueous veins, of which no better proof exists than that it was I who proposed the name of "Ascher's veins" for pure aqueous veins.

And now to Ascher's accusation that I have copied him:

1. It is not true that Fischer had any correspondence with me about the aqueous veins or that we discussed the question of their discovery when he and his family were my guests in 1946. Therefore, Fischer cannot have written any letter containing the statement that he concluded anything about the discovery of the aqueous veins "after extensive correspondence with Goldmann" as Ascher pretends, or because Fischer stayed in my house. Fischer lived until 1949, but only after his death did Ascher try to prove his accusation by some citations out of a letter written by Fischer in 1946, now that Fischer himself is absolutely unable to give any personal statements.

2. After May 1940, Switzerland was entirely surrounded by the axis powers and, after Pearl Harbor, American books and journals ceased to arrive at Berne (even now our set of American wartime journals is incomplete, despite all our efforts). Therefore, only after my communication concerning the outflow of the aqueous (Swiss Ophthalmological Society, June 10, 1945), did I learn of Ascher's work during the war and in the publication of my paper of the meeting I indicated clearly Ascher's priority.

3. In his letter, Ascher communicates a table which shows that he and I found the same properties of the aqueous veins, concerning their size, stability, stratification, pulsation, and increase of clear fluid after compression of the eyeball. Ascher takes this as a proof that I have copied him. But to recognize aqueous veins means to see their characteristic qualities. No observer has recognized aqueous veins who has not seen vessels with a stable stratified content, vessels which pulsate and which broaden on pressure and so forth. But Ascher forgets that in my first communication—and only of that finding do I claim priority—I was the first to prove, by my fluorescein method, that it is aqueous that flows in these vessels.

(Signed) Hans Goldmann,
Berne, Switzerland.

BOOK REVIEWS

GIFFORD'S TEXTBOOK OF OPHTHALMOLOGY.

By Francis Heed Adler. Philadelphia, W. B. Saunders Company, edition 5, 1953. 488 pages, 281 figures, 26 color plates, index. Price: \$7.50.

In the preface of this new edition of a well-known textbook, Dr. Adler says "the experience gained from five years of teaching undergraduate students in ophthalmology using the fourth edition of this textbook has demonstrated numerous ways in which it might be improved."

There were a number of valid criticisms of his fourth edition in so far as its purpose, namely a textbook for undergraduates, was concerned, and many students found it to be a difficult text, too advanced for them to grasp readily. In this edition, the author has wisely taken to heart this factor and has properly laid emphasis on the essential facts of ophthalmology as it pertains to general medical interest.

The result is entirely satisfactory. Proper emphasis is placed on the general diseases, such as vascular hypertension, diabetes, and others that affect the eye. The chapter on ocular motility has been considerably shortened, and I think much improved thereby, and the various surgical techniques are omitted. In place of the latter, a chapter on orientation on surgical operations on the eye and adnexa has been substituted. This should be of value in explaining to the student and general practitioner the need for surgery in certain instances.

This is a fine, modern, and well-written book, beautifully printed and illustrated. It deserves popularity.

Derrick Vail.

CLINICAL ALLERGY. By French K. Hansel, M.D., M.S. St. Louis, C. V. Mosby Company, 1953. Cloth, 1005 pages, 86 illustrations, 3 color plates. Price: \$17.50.

This is a comprehensive text on allergy

covering virtually all phases of the subject. The otorhinologic aspects are presented with convincing detail from the author's wide experience and the section on ophthalmology is adequate. However, when discussing other subjects such as asthma, dermatoses, or antihistamines the text becomes a compilation. Frequently a page or two of the text is devoted to the citing of a single paper and with some subjects, such as the antihistamines, a published monograph by other authors may form the major basis for a particular chapter. The work thus becomes more encyclopedic and compilatory than critical.

In some aspects, the concepts advanced are highly individualistic and controversial. Among these may be mentioned the extremely minute doses used in desensitization, the preference for coseasonal treatment of hay fever, the use of sublingual pellets of antigens for desensitization, the enthusiastic recommendation of staphylococcus toxoid in urticaria, and the therapeutic administration of "a good composite house-dust mixture" in cases of severe asthma without bothering to determine the existence of dust sensitivity.

When a rhinologist writes on asthma it is not too surprising that he classifies it into "chronic" and "paroxysmal," the latter to designate periodic as contrasted with continuous. It is not too surprising, but misleading to the novice, when he puts cardiac asthma in quotation marks and suggests that "the condition is not true asthma" and that the term "asthma" should not be employed.

All asthma is bronchial, the mechanics consisting of bronchospasm, mucosal edema, and the production of tenacious secretion. The stimulus starting off this mechanism may be an antigen-antibody reaction, bronchial infection, or pulmonary congestion left from heart failure, or perhaps even psychosomatic.

The publisher has done a beautiful job in the format and in the printing. The book can be recommended as a good reference text for the experienced person but it will be confus-

ing to the ophthalmologist or to any one not thoroughly experienced in allergy.

S. M. Feinberg.

BULLETIN OF THE GREEK OPHTHALMOLOGICAL SOCIETY. Athens, Greece. Volume 18, Part 2, 1950.

This is a commemorative number dedicated to two renowned Greek ophthalmologists, Ananias Gabriélidès and Alexius Trantas, on the occasion of their eightieth birthdays. A biographic sketch of each is given, and a 60 page résumé, with bibliography, of the scientific work of Trantas was contributed by his nephew, Dr. Nico Trantas.

Gabriélidès, who was the founder of the Greek Ophthalmological Society, inaugurated his scientific career with the discovery of the dilator muscle of the pupil in man, the existence of which had previously been in dispute. Throughout his life he was a profound student of bacteriology and of the microscopic anatomy and embryology of the eye, and was the first to attempt the classification of inflammations of the conjunctiva on a bacteriologic basis and to publish a manual of ophthalmic bacteriology.

Trantas is, or at least should be, well known to ophthalmologists everywhere as the discoverer of the diagnostic techniques of gonioscopy and velanoskiascopy, and much of his scientific endeavor has been devoted to elaboration and promotion of these valuable methods of diagnosis. He has also made significant contributions to our knowledge of phlyctenular conjunctivitis, night blindness, vernal conjunctivitis, and fundus changes in leprosy.

Prof. G. Cosmetatos classified secondary cataracts in three groups and describes his operation for each. Uncomplicated secondary cataracts may be removed with forceps; dissection is advisable if posterior synechias are present; if the pupil is secloded, a vertical iridocapsulotomy is recommended.

Prof. J. Charamis, in a survey of ocular cysticercosis in Greece, says that 17 cases have been reported. He calls attention to the doctoral dissertation of K. Roussodimos, published in Athens in 1944, which is an exhaustive treatise on the subject.

B. Adamantiadis and Ouranie Rangabi discuss the clinical and pathologic aspects of posterior annular detachment of the vitreous. From their study of 26 cases they conclude that it has no bad prognostic significance as regards subsequent detachment of the retina.

S. Alexiadès and M. Zografos report inconclusive results in their attempts to apply Benda's method of granulodiagnosis to cases of suspected ocular tuberculosis. Polymorphonuclear leukocytes are examined for the presence of certain toxic granules which have been noted in tuberculous patients.

J. Vlachos outlines the ophthalmologist's role in the diagnosis and treatment of brain tumor, and N. Dascalopoulos reviews and evaluates the theory of focal infection, to which, in the light of his experiences, he gives cautious assent.

P. Dededimos reaffirms his belief that vernal conjunctivitis and the other allergic conjunctivides are caused by a local imbalance of the neurovegetative nervous system resulting in a hypersensitivity of the conjunctiva to certain provocative agents. The nature of the subjective complaints, the blood picture, and the immediate and almost complete relief afforded by simple cauterization of the sphenopalatine ganglion, are all characteristic of parasympathetic hyperfunction and indicate a common etiologic background.

T. Dimitriou proposes a method of lining the orbital cavity with buccal mucous membrane in cases of anophthalmos where the fornices are more or less obliterated and the socket must be reconstructed to make it suitable for a prosthesis. His method requires splitting the tarsus of each lid, starting from the palpebral margin, in such a way

that the posterior layer, consisting of one third of the thickness of the tarsus, may be swung backward into the orbit. The traumatized surface of the two layers of each tarsus affords a firm support for the mucous membrane.

For obtaining as natural a movement as possible for a prosthesis without any kind of implant in the orbital cavity, A. Théodoridès explains his method of suturing with catgut the tendons of each of the rectus muscles to a corresponding point in the fornix. On contraction of any one of the muscles, a hollow is formed in the fornix and motion in the direction of the hollow is imparted to the prosthesis.

T. Théophylactos outlines his method of treating trachoma with grattage, irrigation with mercuric cyanide, and hourly instillations of penicillin. J. Nicolacopoulos describes his routine subjective method of refraction with letter chart and astigmatic dial. He uses a cycloplegic only in small children with convergent strabismus.

S. Spyratos reports a case of accidental autovaccination of an eyelid on the fourth day after vaccination of the arm. Despite a take, the lid healed without apparent scarring, probably because by that time considerable resistance to the vaccine had been built up.

G. Tacticos tells of the campaign initiated by the Greek government against trachoma in 1923-24 and assisted in later years by contributions from U.N.R.R.A. and the Marshall Plan. Trachoma is still a serious scourge in Greece, where an estimated 3.6 percent of the population is affected with it.

In a 22-page monograph, C. Djacos traces the history of entropion and trichiasis from remote antiquity, reviews the hypotheses regarding their physiopathology, and discusses the various types of operation that have been proposed for their relief. For the lower lid in all cases and for the upper lid in occasional cases, he recommends Van Millingen's operation; otherwise he recommends as ideal

for the upper lid his own operation which he has used in hundreds of cases with perfect satisfaction, without recurrence and with excellent cosmetic results. His procedure consists in removing a narrow strip of tarsus five mm. from the ciliary margin and then uniting the lower portion of the tarsus to the upper with a continuous catgut suture in such a way that the margin of the lid is drawn forward away from the eyeball.

Prof. T. Tjanides presents his latest views on the glaucomatous syndrome and its treatment. Since various apparently unrelated entities are lumped together under the term "glaucoma," he suggests that we might well abandon this term and its subdivisions and might more rationally and with a closer approach to reality substitute for it the more general designation of "glaucomatous syndrome." Because of the high incidence of low-grade iridocyclitis and of cataract after any kind of fistulizing operation, he much prefers Weekers' iridencleisis and Weekers' nonperforating diathermy to the ciliary body. With this latter operation he has had excellent results uncomplicated by any inflammation of the anterior segment.

T. Joannides tells of introducing air into the anterior chamber after certain operations and reports his own success in breaking down anterior synechias. B. Tsopelas describes and explains the use of Greens' refractor, J. Fromimopoulos discusses contact lenses, and E. Tahindjis details and interprets the findings in three cases of tumor of the pituitary gland.

D. Sinikis relates in a humorous vein of once meeting in a remote Turkish village an aged woodman who avowed his sight had been saved by two Greek miracle workers and in proof thereof brought forth from his wallet two precious talismans, each of which turned out to be a carefully treasured doctor's prescription, never filled to be sure but effective all the same, one from Trantas and the other from Gabriélidès, both of whom had practiced in Constantinople until compelled

to leave the country in 1922 for political reasons.

Résumés of the biographic and bibliographic notices, as well as of all the articles, are given in French.

Harry K. Messenger.

SIDE EFFECTS OF DRUGS. L. Meyler, Consulting Physician at Groningen, Netherlands. (Translated by Ph. Vaijsje and W. Mulhall Corbet, Amsterdam.) New York, Elsevier Publishing Company (300 Park Avenue), 1952. 268 pages. Price: \$5.50.

Mother, mother, I am ill!
Call the doctor from over the hill!
In came the doctor, in came the nurse,
In came the lady with the alligator purse,
Penicillin, said the doctor,
Penicillin, said the nurse,
Penicillin said the lady with the alligator purse.

There is an increasing tendency toward using potent therapeutic agents for relatively inconsequential disease conditions, despite the observation that there have been 176 deaths recorded in the medical literature as due to drug administration since 1946. Presumably, additional fatalities have been unreported or unrecognized. Many other complications of drug therapy have not caused death but have resulted in much discomfort and occasionally permanent disability.

The subject of this brief book is, thus, of considerable pertinence. In it, Meyler surveys the current literature and lists concisely and usually without comment the complications and reactions attributed to drug therapy in recent years. References appear to be unusually complete in reviewing the world periodical literature on the subject since 1946. The antibiotics merit some 288 references, the sulfonamides 151, metals 219, and other subjects are proportionately well covered. As might be anticipated, the eye is frequently implicated and there are numerous references to ocular complications.

The text is divided into 25 chapters, sev-

eral comprising only a few pages while others, notably those dealing with metals, sulfonamides, antibiotics, and hormones, are much longer. The material appears to have been ruthlessly condensed with many sentences losing their verbs in the process; usually these amputations do not detract from the meaning but they do not contribute to reading comfort.

Unfortunately, the pharmacologic basis of the various drugs is usually not stated and, in a number of instances, a normal action is presented as a side effect. Thus miosis is listed as a side effect of dibenamine, pilocarpine, and prostigmine, and compounds causing mydriasis are similarly mentioned. It became necessary for this reviewer to refer frequently to a standard pharmacologic text to learn if the side action listed by Meyler was the normal pharmacologic action or an example of quantitative hypersensitivity to an ordinary action with emphasis upon a usually negligible side action or an allergic response, or a truly abnormal sequela of drug administration.

The chief value of the book is largely as a source of recent references to drug complications. Much of the material presented is already incorporated in pharmacologic textbooks. However, the complications of the newer antibiotics, cortisone, ACTH, and some of the recently introduced autonomic drugs, cannot be found as yet in any other book, although they are well covered in the literature.

Frank W. Newell.

OPTALMOLOGIA ESPECIAL TEORICA Y CLINICA. By Dr. Manuel Marquez. La prensa medica mexicana, Zacatecas 21-25, Mexico, D. F., 1952. 783 pages, including index, with 680 illustrations, two in color. Price: 140 pesos.

This latest work of Professor Marquez is a condensed, fairly complete text covering the whole field of ophthalmology. It embraces

the essence of his preceding books on the subject and presents in one volume the numerous original contributions which he has made for over half a century. The various subdivisions of the specialty, such as the medical, surgical, and optical phases, are well proportioned and lucidly explained. Few writers have such a crisp, clear didactic style as this author and the reader will be greatly helped also by the very large number of instructive diagrams, figures, and photographs.

The author has his own ideas on many controversial points and expresses them forcefully. One may or may not fully agree with him, but the reader knows exactly where the author stands. His view on the origin and pathogenesis of glaucoma, for instance, his evaluation of the various operative techniques, especially those for cataract, are clearly set forth. His divergence from the prevailing views on these subjects is logically presented and explained.

Several topics discussed in this book are to be found in no other text. For example, the author's treatment of a case of complete opacity of the corneas of both eyes resulting from applying (by mistake) a strong, seven-percent silver-nitrate solution without subsequent neutralization of the excess with sodium chloride. The author, after mechanical removal of the superficial epithelium, applied hot five-percent sodium hyposulfite and obtained complete recovery. The colored plate illustrating this case tells a graphic story. Also the author's method of diagnosing strabismus by a coördinated system of diplopia tests, "the method of concordance," is an original contribution not found in books by other writers.

There is a wealth of material in this book which, although written primarily for doctors just entering the specialty of ophthalmology, is sufficiently advanced to be of distinct value to the seasoned practitioner.

Joseph I. Pascal.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

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| 1. Anatomy, embryology, and comparative ophthalmology | 10. Crystalline lens |
| 2. General pathology, bacteriology, immunology | 11. Retina and vitreous |
| 3. Vegetative physiology, biochemistry, pharmacology, toxicology | 12. Optic nerve and chiasm |
| 4. Physiologic optics, refraction, color vision | 13. Neuro-ophthalmology |
| 5. Diagnosis and therapy | 14. Eyeball, orbit, sinuses |
| 6. Ocular motility | 15. Eyelids, lacrimal apparatus |
| 7. Conjunctiva, cornea, sclera | 16. Tumors |
| 8. Uvea, sympathetic disease, aqueous | 17. Injuries |
| 9. Glaucoma and ocular tension | 18. Systemic disease and parasites |
| | 19. Congenital deformities, heredity |
| | 20. Hygiene, sociology, education, and history |

1

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Kurus, Ernst. **The innervation of the retinal vessels.** *Klin. Monatsbl. f. Augenh.* 121:318-324, 1952.

The author reports his studies on the small nerves accompanying the retinal vessels. He used flat sections and silver impregnation. A reticulum of fine nerves accompanies all vessels and he assumes that these are sympathetic. In addition, nerves coming from the nerve fiber layer join the vessels. These are assumed to be parasympathetic. (6 figures, 15 references)

Frederick C. Blodi.

Rodger, F. C. **Some observations on the corneal innervation.** *Tr. Ophth. Soc. U. Kingdom* 71:687-693, 1951.

A study of corneal innervation was undertaken by the use of intravital and supravital staining with methylene blue, gold and silver impregnation, polarized light, the biomicroscope and phase contrast in which "razor slices" are examined with a microscope fitted with annular phase plates. In this way the relationship of the nerves to the neighboring cells and the modes of termination could be ascer-

tained. It was found that there are no specialized endings in the cornea, no free endings in the stroma and that the free endings in the epithelium are similar in structure to the endings of pain-conducting fibers in the skin. The neuroarchitecture in the cornea appears to correspond to tactile fibers in the cornea. The presence of parasympathetic fibers has not been disproved. The beaded appearance of some of the nerve fibers appear to be evidence of the nerve fibers' response to change of environment. The medullary sheath protects the fiber and prevents such beading. (8 references)

Beulah Cushman.

Sakamoto, M. **Development of the trigeminus especially the ophthalmic branch.** *Acta Soc. Ophth. Japan* 56:1355-1357, Dec., 1952.

Histologic examination of 25 human fetuses at the fifth to the thirteenth week of gestation revealed that the ophthalmic nerve was recognizable as a projection from the trigeminal ganglion at as early an age as five weeks. Development of the nasociliary and frontal nerve and that of lacrimal nerve were recognized at the sixth and the seventh week respectively.

At the thirteenth week, full development of these nerves was noted.

Yukihiko Mitsui.

Vetter, Joachim. **Macrophthalmia in fish.** *Klin. Monatsbl. f. Augenh.* **121**:434-439, 1952.

The author observed and examined histologically a fish with bilateral hydrophthalmos. He found an enlarged anterior chamber and edema of the cornea. A Schlemm's canal, usually present in goldfish, could not be found. (1 figure, 7 references)

Frederick C. Blodi.

Vogelsang, K. **Ophthalmology and mechanical qualities of the tissues.** *Arch. f. Ophth.* **153**:169-176, 1952.

This is a short review of older studies by several authors which deal with the mechanical qualities of the tissues of the body, especially those of the eye. (37 references)

Ernst Schmerl.

Wislocki, George B. **The anterior segment of the eye of the rhesus monkey investigated by histochemical means.** *Am. J. Anatomy* **91**:233-262, Sept., 1952.

The author examined the various layers of the cornea, the lens with its capsule, the ciliary epithelium, and the zonular fibers. The structures were fixed by six different methods, and then examined after twelve different staining routines. These included stain for reticulum, elastic tissue, lipid, protein-linked sulfhydryl groups, carbonyls, acid mucopolysaccharides, and carbohydrate groups. He then compared these structures with elastic tissue preparations, with collagen, with Reichert's membrane (from the yolk sac of rodents), and Reissner's fiber in the brain. The most notable findings were that Descemet's membrane, the lens capsule and Reichert's membrane have very similar properties, yet differ markedly from elastic tissue; the ciliary zonula and Reissner's fiber are also remarkably

similar; the lens capsule has a different-staining epicapsular membrane beautifully shown in the color plate; strong sulfhydryl reactions are found only in the corneal epithelium, the endothelium, and the lens tissue proper; and the ciliary zonule stains differently from the ciliary epithelium and the epicapsular membrane. (28 figures, 1 color plate, 29 references)

Harry Horwich.

2

GENERAL PATHOLOGY, BACTERIOLOGY, IMMUNOLOGY

Bender, R. M., and Vietze, H. U. **Presence of leptospira in the aqueous humor.** *Ztschr. f. Hyg. u. Infektionskr.* **135**:231-234, 1952.

Uveitis in man and animals can be caused by general infection with leptospira which frequently precedes the eye disease by several weeks or months. Positive agglutination findings in blood, cerebrospinal fluid, and aqueous have been described. The titer is higher in the aqueous than in the blood, whenever the ocular disease is fully developed. It is not clear, whether uveitis and meningitis caused by leptospiral infection are due to direct invasion of the tissues by leptospira or are to be regarded as an allergic antigen-antibody reaction of these tissues. The authors had occasion to do autopsies on a dog and on a silver fox after death from acute leptospiral infection. A great many leptospira were found in the aqueous humor, the blood, spinal fluid, and liver of the animals. The short duration of the disease prevented formation of antibodies which only appear after the tenth day. (22 references)

Max Hirschfelder.

Focosi, M., and Scalfi, L. **Pathogenic action of the Newcastle virus on the ocular tissues of the rabbit.** *Boll. d'ocul.* **31**:513-518, Sept., 1952.

Six rabbits weighing 2.5 kgm. were used

for inoculation of Newcastle virus into the anterior chambers (right eyes) and into the corneal stroma (left eyes). Four, 12, 24 hours and 2, 3 and 5 days after the inoculation the titer of infectiousness was ascertained. After inoculation into the anterior chamber, the cornea lost its infectiousness within 24 hours, the iris and aqueous humor after 48 hours. After intracorneal inoculation, it took at least five days for the cornea but only 24 hours for the iris and aqueous to lose infectiousness. The virus does not multiply after inoculation of either type. The authors assume that a toxic action on iris vessels, and on the corneal tissue, results in changes of nutrition and permeability. (1 table, 16 references) K. W. Ascher.

Machado, Nicolino R. **Ocular mycosis.** An. Soc. mex. de oftal. 24:61-95, April-June, 1950.

Ocular mycosis should be suspected whenever there is an inflammatory process of obscure etiology and an insidious development in the external eye and its adnexa. The rarity of ocular mycosis could be explained on the basis of immunity towards the majority of fungi. The diagnosis of a fungus infection should be made by a competent mycologist. Fresh specimens and special preparations are needed and complement fixation, seroagglutination and skin tests should be done. The infection may be primary or secondary to a nearby lesion. In the external eye and its adnexa the infection is usually airborne but it may be acquired by direct contamination with infected hands or clothing. A detailed list of different species and characteristic lesions caused by the fungi is presented. Fungus infiltration was found in cases of serpiginous ulcers, dendritic keratitis, and in trachoma. Intraocular mycosis is rare and it is seen in perforating wounds of the globe especially with wooden points and when there is contamination with dirt. A

lymphatic or blood borne infection of the eye is seen in generalized mycoses but it is often overlooked. The lacrimal apparatus is rarely infected and its infection is usually secondary to a chronic mycotic conjunctivitis. Orbital mycosis has a grave prognosis because intracranial propagation occurs. (30 references)

Jose Pietri.

Moro, F. **Corneal immunity and keratoplasty. Experimental research.** Ann. d'ocul. 185:833-841, Oct., 1952.

To better understand the immunologic and pathologic reactions that take place in transplanted and receptor corneas, two series of experiments were made in rabbits. The infective agent used was vaccine virus administered by the scarification method of Grueter. In the first series, perforating keratoplasty was performed on the right eye; the left eye was used as a control. After about 25 days, when healing was complete, both eyes were infected. No essential differences were observed in the eyes with keratoplasty and the controls. In a second series the experimental animals were divided into two groups. In the first group, after infection of both corneas had completely healed, transplants from these immune corneas were taken and planted in homologous nonimmune corneas. After healing was complete, the corneas of both eyes were infected. In the second group the corneas were infected and immunization was acquired. After healing was complete, perforating transplants from nonimmune corneas were implanted in immune corneas. When healing was complete, the corneas were infected. Nonimmunized grafts transplanted on immunized corneas participate in the immunity of the receptor tissue, but immunized grafts transplanted in nonimmunized corneas do not transmit immunity to the receptor cornea. The mechanism of the acquired immunity is not clearly understood. Its transmission

is, however, apparently accomplished through both the fluids and cells which enter the graft from the receptor cornea. (6 references)

Chas. A. Bahn.

Mueller, Horst. **Experimental ophthalmia phakogenetica.** Arch. f. Ophth. 153:1-35, 1952.

The author used about 40 albino rabbits and found that 1. the "normergic" reaction to discission of the lens is a mild inflammatory response of the eye; 2. injections of an adjuvans (killed tubercle bacilli in oil injected subcutaneously) most often change the normergic reaction to discission of the lens into a hyperergic response; 3. intravenous injections of bacterial toxins shortly before or after the discission of the lens produce severe reactions, even corneal necrosis; 4. intraocular injections of cataractous lens material do not even suggest primary toxicity of the lens; 5. sensibilization to lens substance causes an increased hyperergic reaction of the eye to discission of the lens; and 6. bacterial infection is probably no pathogenic factor in ophthalmia phakogenetica.

This study was performed at Stanford University, San Francisco. The pertinent literature is discussed in detail. (9 figures, 2 tables, 150 references)

Ernst Schmerl.

Nover, Arno. **Eye changes in arteriolitis obliterans and periarteritis nodosa.** Klin. Monatsbl. f. Augenh. 121:297-306, 1952.

The first case occurred in a 44-year-old man who developed a generalized arteriolitis obliterans with malignant hypertension subsequent to a polyarthrititis. There was a marked angiospastic retinopathy. The patient died and the histologic examination revealed severe changes in many ocular vessels. There was thickening of the intima, swelling of the media, and proliferation of the adventitia.

Three more cases are reported in which

periarteritis nodosa was found at autopsy. There were changes in the ciliary, choroidal, and retinal vessels of varying degree. (8 figures, 31 references)

Frederick C. Blodi.

Riehm, W. **Tuberculin sensitivity in phlyctenular inflammations.** Klin. Monatsbl. f. Augenh. 121:454-463, 1952.

The strong reaction to tuberculin in patients with phlyctenular keratoconjunctivitis is an expression of the elective sensitivity of the skin. (3 references)

Frederick C. Blodi.

Riehm, W. **The relation between allergy in infectious diseases, experimental allergy, and idiosyncrasy.** Klin. Monatsbl. f. Augenh. 121:283-292, 1952.

The author compares the favorable effect of antibody formation in infectious diseases and after therapeutically induced allergens with idiosyncrasy. In the latter he suspects an increased permeability of the body to allergens.

Frederick C. Blodi.

von Sallmann, Ludwig. **Effects of radiation on the cytology of the eye.** J. Cell. and Comp. Physiol. 39:217-233, July, 1952.

Investigations were made of the roentgen ray damage to the crystalline lenses of mature chinchilla rabbits. One eye of the animal was subjected to a single exposure of 2,000 r and the fellow (control) eye, though shielded, received 5 to 7 r of stray radiation. Meridional and flat epithelium and capsule sections were studied microscopically. Histologic changes occurred as early as the first week after radiation. The objective changes, not visible with the ophthalmoscope until the fourth week, appeared as a dark granular ring of opacification in the equatorial region. Increased permeability to radioactive substances was especially present in the eyes showing X-ray cataract as shown by the

increase in the uptake of the radioactive indicators, particularly radiosodium.

F. M. Crage.

Santoni, A. **Antihemoagglutinating antibodies in the aqueous humor during influenza.** *Boll. d'ocul.* **31**:519-526, Sept., 1952.

Although the rabbit is not subject to infection by the influenza virus, the author studied the action of influenza virus A (PR8) after intravenous injection of 8 cc. allantois fluid from influenza-infected chicken embryos in seven rabbits weighing about 2 kgm. Ten days after this injection the aqueous humor was withdrawn, 5 cc. of blood was obtained by cardiac puncture and the antihemoagglutinating titer was ascertained immediately and 24 hours later, when another paracentesis was performed. Intravenous introduction of the virus did not cause passage into the aqueous humor of antihemoagglutinating antibodies which are present at high titer in the blood. In the secondary aqueous humor, a slight amount of these antibodies was found. When inoculated into the cornea, the antibodies are limited to the infected eye and to the blood. (1 figure, 2 tables, 10 references)

K. W. Ascher.

Schreck, Eugen. **The virus of sympathetic ophthalmia.** *Arch. f. Ophth.* **153**: 36-56, 1952.

This paper is the author's second report of his discovery of the microorganismus sympathicus. It deals with the anatomical changes produced in the chicken where the organismus is normally harbored, or after the experimental transmission from diseased men. Visual apparatus, brain, respiratory tract, liver, spleen, intestines and kidneys were found to be affected. Clinically, ocular, cerebral, catarrhal, and intestinal signs had been noticed. The pathologic picture most often seen is epi-

thelial, perineural and perivascular infiltration. Follicles of lymphocytes, eosinophiles and mast cells are found rather frequently. Other cell types, such as plasma cells, histiocytes, leucocytes and giant cells occur comparatively seldom. Particles of a brown pigment are frequently observed. The perivascular infiltrations might represent a specific periangiitis migrans. The specific organism is found in the conjunctiva, nictitating membrane and tear glands, in the vitreous, uvea and the other tissues mentioned above. The author feels that the chicken must be considered a carrier of the virus of sympathetic ophthalmia. The use of the phase microscope, fixation of the tissues in Carnoy's solution and staining with Giemsa, Pappenheim or Unna, proved most helpful. (7 figures)

Ernst Schmerl.

Travi, O., Cabanne, G. R., Dellatorre, C., and Paunessa, J. M. **Viruses in ophthalmology.** *Arch. oftal. Buenos Aires* **27**: 145-172, April, 1952.

This is an extensive, partly historical, partly contemporaneous survey of the discovery, effects and types of viruses in general and those affecting the eye in particular. The several generally recognized virus diseases of the eye are outlined, with their symptomatology, treatment and prognosis.

Joseph I. Pascal.

Vidal, Flaminio. **Biological diagnosis of cancer.** *Arch. oftal. Buenos Aires* **27**:1-2, Jan., 1952.

The serum of patients having malignant tumors, especially tumors of the genital organs produces modifications in the mitotic index of the basal and prickle-cell layers of the corneal epithelium of the normal guinea pig. The intensity of the changes varies according as one examines the eye treated with the serum, or the other eye, where the stimulation is

much greater. This reaction may be useful in the diagnosis of cancer.

Joseph I. Pascal.

Wueseke, W. **The influence of temperature on the microorganism causing sympathetic ophthalmia.** *Klin. Monatsbl. f. Augenh.* 121:324-328, 1952.

The author reports his experiments with the microorganism which Schreck believes causes sympathetic ophthalmia. It is best cultured at body temperature and temperature changes of more than 8° C. inhibit its virulence. (7 references)

Frederick C. Blodi.

3

VEGETATIVE PHYSIOLOGY, BIOCHEMISTRY, PHARMACOLOGY, TOXICOLOGY

Boles Carenini, B., and Cima, V. **Action of synthetic antihistaminic drugs and of cortisone on the anaphylactic keratitis of the rabbit.** *Boll. d'ocul.* 31:586-592, Oct., 1952.

Anaphylactic corneal disease was elicited in rabbit eyes, following the classical Wessely method (1911). In 3 animals, no therapy was given; 6 were given cortisone ointment, 6 antistine instillations, and 10 both cortisone and antihistaminics. Cortisone administered immediately after the provoking injection inhibited the development of the anaphylactic keratitis; later on, it had a favorable effect on the course of the keratitis as did antistine. The possible mechanism of these therapeutic effects is discussed. (10 references)

K. W. Ascher.

Bruna, F. **Action of hydrazide of isonicotinic acid on experimental ocular tuberculosis.** *Boll. d'ocul.* 31:527-546, Sept., 1952.

Suspensions of bovine tubercle bacilli were injected into the anterior chamber of rabbits. Treatment was started in one

group when the exudative phase of the reaction became manifest, in another group after development of nodular iritis. For 31 to 68 days, daily doses of 8 to 12 mgm. of hydrazide of isonicotinic acid per kgm. were administered intramuscularly. While in the control animals the necrotic-caseous phase was reached, the treated animals showed complete recovery in the first group, and in 50 percent of the rabbits of the second group. However, in the first group recurrence of tuberculous infection was observed less than four weeks after discontinuation of treatment; in the second group, tubercle bacilli were found in cultures from the iris tissue of clinically recovered eyes; staining of iris sections revealed tubercle bacilli. Pathologic study of the eyes of treated animals revealed signs of moderate inflammation whereas inflammation was severe in the control group. Rabbits with recurrence were not benefited by resumption of the same treatment; this might be explained by drug resistance acquired by the bacilli. (6 figures, 3 tables, 25 references)

K. W. Ascher.

Bruna, F., and Salvi, G. L. **Action of cortisone on experimental herpes infection.** *Boll. d'ocul.* 31:547-558, Sept., 1952.

Chick embryos and mouse brains were subjected to infection with strain H.F. of herpes virus which proliferated markedly despite, or because of, cortisone treatment. The death rate of the treated animals was higher than that of the controls. (4 figures, 1 table, 23 references)

K. W. Ascher.

Campbell, Fergus W. **The influence of a low atmospheric pressure on the development of the retinal vessels in the rat.** *Tr. Ophth. Soc. U. Kingdom* 71:287-300, 1951.

The author reports experimental work carried out on rats which were placed in

a low-pressure environment 24 to 36 hours after birth. They were removed at varying intervals and the development of the retinal vascular system was studied after India ink injection, and compared with rats allowed to develop normally. The retinal vessels were formed by an extension of the hyaloid vessels at the disc, the capillaries developed by a process of budding from the veins. In the low-pressure group the arteries, veins and capillaries were of smaller caliber, and resembled the definitive network of the more mature animal. The capillary free zone in the low-pressure group of animals was significantly smaller than in the control group. The rate of progression of the vascular system from the optic disc to the periphery of the retina was diminished under the conditions of the low-pressure chamber. An important factor in the formation of the retinal vascular systems appears to be the oxygen tension of the inner layers of the retina. (4 figures, 3 references) Beulah Cushman.

Cascio, G., and Caselli, F. **Permeability curve of the rabbit's eye during intoxication with sodium iodate.** *Boll. d'ocul.* 31: 577-585, Oct., 1952.

Using the method of Amsler and Huber (1946) the authors first defined the blood-aqueous barrier in six normal rabbits, and compared their figures with those obtained after treating these animals with sodium iodate, administered intravenously in a 4.5 percent solution, 1 cc. being injected per kilogram of body weight daily. Readings were plotted on the third and sixth day of treatment and, in addition to the well known retinal degenerative changes, a definite increase in the ciliary body permeability was found. (4 figures, 3 tables, 7 references) K. W. Ascher.

Dodt, Eberhard. **The electrophysiology of the eye: inhibitory processes occurring**

in the human retina. *Arch. f. Ophth.* 153: 152-162, 1952.

The author used the same method as described and abstracted before. Forty experiments were performed in five persons and the following results were obtained. If a light stimulus is followed by a second stimulus in a short time, inhibition of the b-wave of the second stimulus becomes noticeable. Duration and intensity of the inhibition of the second stimulus depend upon the intensity of the first light stimulus. Pre-excitatory inhibition under similar experimental conditions can be recognized from the occurrence of a short negative a-wave preceding the b-wave of the second stimulus. This finding demonstrates off-discharges of the human eye following the break of light stimuli. The positive off-discharges become more pronounced when with the help of intense intermittent light stimuli the scotopic retinal activity becomes abolished by post-excitatory inhibition. Light stimulation after the off-discharge produces a marked negative a-wave and the mixed human retina now behaves like a photopic visual organ. (5 figures, 22 references) Ernst Schmerl.

Gezurian, Z. L., and Persoglia, J. M. **The action of cortisone on the mitosis of the corneal epithelium of the normal guinea pig.** *Arch. oftal.* Buenos Aires 27: 30-31, Jan., 1952.

The mitotic index of the epithelium of the normal cornea of the guinea pig varies according to the instillation of pure cortisone or when diluted to 20 percent. The following results were obtained. In corneas treated with pure cortisone the mitotic index of the basal layer was 36 percent, the mitotic index of the prickle cell layer was 35 percent. In corneas treated with cortisone diluted to 20 percent the mitotic index of the basal layer was 22 percent, the mitotic index of the

prickle cell layer was 139 percent. In all cases atypical mitotic figures were observed.
Joseph I. Pascal.

Gezurian, L. Z., and Persoglia, J. M. **The action of cortisone on mitosis of the corneal epithelium of a normal guinea pig.** Arch. oftal. Buenos Aires 27:187-192, April, 1952.

Five photomicrographs showing these changes which were inadvertently omitted in a previous paper (January, 1952) are presented.
Joseph I. Pascal.

Goulding, R., and Robson, J. M. **Isoniazid in the control of experimental tuberculosis.** Lancet 2:849-853, Nov., 1952.

Isoniazid had a suppressive action on corneal tuberculosis of mice only during the period of its administration; combined with P.A.S. it was somewhat more effective and combined with streptomycin it gave a much better result. In the rabbit, isoniazid showed itself more strongly antituberculous than streptomycin or a combination of the two drugs. The different response in the two animals is probably due to a higher corneal temperature in the rabbit. (11 figures, 8 references)
Irwin E. Gaynon.

Hagedoorn A. **Cortisone in ophthalmology.** Nederl. tijdschr. v. geneesk. 96:3030, 1952.

The author provides an ample and thorough discussion on the action of cortisone in ophthalmology. His experience emphasizes the advantages but he sounds a warning note against injudicious use of the drug.
G. H. Jonkers.

Knuepffer, Nicolai. **Comparison of new antiglaucomatous drugs.** Klin. Monatsbl. f. Augenh. 121:348-352, 1952.

Mintacol has been used in Germany for the last two years. It is administered in a

1:6,000 solution and equals a 2-percent pilocarpine solution in its pressure-reducing effect. The miotic effect is stronger and retinal detachment was observed as its sequel in one eye. D.F.P. was used as 0.1-percent Floropryl. The miotic and pressure-reducing effect was greater than with any other drug. Doryl Z, a combination of Doryl with an emulsifier, was more effective than simple Doryl. It is, however, still too unreliable to be the drug of choice. (10 references) Frederick C. Blodi.

Lange, Fritz. **Bilateral optic atrophy after thallium poisoning.** Klin. Monatsbl. f. Augenh. 121:221-223, 1952.

A man emptied a bottle which contained 0.75gm. thallium sulphate and did so again 10 days later with suicidal intent. Five weeks later retrobulbar neuritis was noted which ended in atrophy. He also had evanescent unilateral trochlear paralysis and injury to the sympathetic nervous supply. The injuries are possibly the result of the combined action of the poison and a latent disseminated encephalomyelitis. (17 references)

Frederick C. Blodi.

Lange, Fritz. **The sensitivity to light of the different retinal areas and its changes with age.** Arch. f. Ophth. 153:93-104, 1952.

The light sensitivity of a small number of healthy persons was perimetrically examined. Threshold stimuli were determined with the help of an adaptometer. It could be shown that the retinal sensitivity to light decreases with age. In two cases of glaucoma with a normal visual field a diminished sensitivity to light could also be demonstrated. (5 figures, 1 tables, 14 references)
Ernst Schmerl.

Leydhecker, Wolfgang. **The treatment of chemical injuries to the eye with Vasculat.** Klin. Monatsbl. f. Augenh. 121:412-419, 1952.

Vasculat is a new synthetic vasodilator which affects especially the capillaries. The drug can be instilled or injected subconjunctivally. The results were encouraging in 21 patients but an allergic reaction may occur. (5 figures, 2 tables, 14 references) Frederick C. Blodi.

Loehlein, Walther. **The course of a severe Optochin poisoning.** Klin. Monatsbl. f. Augenh. 121:25-33, 1952.

Optochin is a drug which was used after the first world war in the treatment of pneumonia. It was known to have a toxic effect on the retina and the optic nerve. The author examined a 35-year-old woman who had been given Optochin at the age of two years. The vision was 1/6 in both eyes. The optic nerves were atrophic, the retinal vessels attenuated and pigment proliferations were visible in the periphery of the fundus. (4 figures, 8 references) Frederick C. Blodi.

Moncino, N., and Spina, P. **Experimental research on the action and tolerance of the rabbit's eyes to Furazine.** Rassegna ital. d'ottol. 21:364-370, Sept.-Oct., 1952.

The authors have studied the tolerance of the new synthetic antibiotic Furazine (5-nitro-2-furaldeido-semicarbazone) when instilled, injected subconjunctivally, or placed in the anterior chamber and in the vitreous cavity of rabbits. Collyria with 40 percent Furazine were nonirritating to the conjunctival sac and 2 percent injected subconjunctivally was perfectly tolerated. Solutions of 2 percent caused no reaction in the anterior chamber, nor did 0.5 percent in the vitreous. The antibiotic is considered to be well tolerated and superior to other similar drugs. (14 references) Eugene M. Blake.

Nordman, J., and Mandel, P. **The metabolism of glucides in the lens.** I.

Anaerobic glucides. Ann. d'ocul. 185:929-943, Nov., 1952.

Glucides or carbohydrates are apparently the most important source of energy in lens metabolism. Polysaccharides are unimportant or nonexistent. The transformation of monosaccharides such as glucose into carbon dioxide and water is accomplished by anaerobic glycolysis through several intermediate steps. Each step is accompanied by the release of energy and by-products such as lactic and pyruvic acids. The process is primarily phosphorylation. The enzymes hexokinase, lactic dehydrokinase, and phosphoperuvikine make the biochemical reactions possible in the living lens. Senile lens opacities are apparently largely due to the decreasing phosphorylation that takes place with increasing age. (2 tables, 29 references) Chas. A. Bahn.

Paycha, F. C. **Preliminary observations on the effects of subconjunctival injections of cortisone.** Arch. d'opht. 12:516-523, 1952.

Paycha injected four patients with 2.5 mg. of cortisone subconjunctivally and on the first and ninth days thereafter studied their weights, blood pressures, 24-hour urine volumes and densities, the pressures in the central retinal artery, intraocular pressures, fields, color visions, fundi, anterior segments, and the characteristics of the aqueous humor obtained by puncture, including albumin and chloride levels. No systemic effects of any kind were noted. The presence of subconjunctival cortisone was well tolerated by the eyes. The only local effects, apart from the effects on the aqueous, were a slight restriction of the visual fields and a slight improvement in color recognition. In the aqueous punctates the albumin titers were unchanged but the chloride content was elevated. No cellular reaction in the aqueous was noted. (2 figures, 1 chart) Phillips Thygeson.

Redi, F., and Miglior, M. **Cortisone and the hemato-ophthalmic barrier.** *Rassegna ital. d'ottal.* 21:351-363, Sept.-Oct., 1952.

The subconjunctival administration of cortisone in healthy eyes revealed no modification of ciliary permeability, either from a single injection or from prolonged use. In cases of uveitis, where the permeability is already increased, cortisone does not change the permeability until after long continued use. Ten cases are reported relating to the permeability of the capillaries in disease of the anterior uveal tract. (3 figures, 28 references)

Eugene M. Blake.

Revol, L., and Nouvel, G. **The preparation of aqueous collyria.** *Ann. d'ocul.* 185:753-763, Sept., 1952.

In the pharmacology of aqueous collyria the most important factors are isotonicity, ionization, stability, sterility and therapeutic action. The isotonicity of the tears normally corresponds to that of a 0.9 to 1.4 percent solution of sodium chloride; 1.2 percent is most frequently used. The techniques employed in the British, French and Swiss pharmacopea are mentioned. The ionization or pH of the tears normally varies from 7.0 to 8.5. The pH of collyria is potentially important because frequently it determines solubility and such side effects as burning and lacrimation. The pH adopted for each collyrium will therefore be a compromise between the pH therapeutically desirable and that which brings about greatest chemical stability. Correct ionization is most practically accomplished by buffer solutions which tend to maintain a specific pH even though bases or acids are added. For collyria containing local anesthetics, adrenalin, and eserine, the one most frequently employed is an isotonic boric acid solution with a pH of 5. Buffer solutions containing hydrated monosodium phosphate, anhydrous disodium phosphate and sodium chloride

with a pH of 6.8, are preferred by the author to collyria containing atropine, homatropine, and pilocarpine. Special formulas are advised for collyria containing sulpha drugs and penicillin; 1 percent sodium metasulphide should be added to eserine solutions to prevent oxidation.

Sterilization is usually best accomplished by boiling for 30 minutes. Glass containers with minimal alkalinity are preferred. (2 tables, 8 references)

Chas. A. Bahn.

Sedan, Jean. **Intoxication by D.F.P. observed in workers in a biochemical laboratory.** *Ann d'ocul.* 185:903-908, Oct., 1952.

The ocular and extraocular symptoms of four laboratory workers who were not fatally poisoned by D.F.P. fumes, but made violently ill, are discussed in detail. The ocular symptoms included extreme miosis and pain. Vision was only slightly reduced, no inflammatory reaction was present and the blood vessels of the external and internal structures of the eye remained practically normal. The extraocular symptoms included bronchospasm and cardiac fibrillation, which were severe and lasted more than three weeks. The blood pressure and urine remained approximately normal. In experimental animals death is due to cardiac failure. D.F.P. completely blocks the action of the body esterases, apparently by the stimulation of a brain center which directly or indirectly regulates protein enzymatic function throughout the body.

Chas. A. Bahn.

Staiger, Guntram. **Fluorescein in the anterior chamber.** *Klin. Monatsbl. f. Augenh.* 121:184-199, 1952.

The author used the method of Amsler and Huber. He found increased values after diathermy to the eye, during menstruation, in uveitis and in some cases of glaucoma. (9 tables, 28 references)

Frederick C. Blodi.

Weigelin, E., and Peters, E. **The differential pressures of the central retinal and the brachial artery in health.** Arch. f. Ophth. 153:105-119, 1952.

Two hundred normal persons were studied, using Mueller's dynamometer for the eye and Korotkoff's procedure for the arm. The average value of the differential pressure of the brachial artery was found to be 39.8 ± 9.3 mm. Hg, and for the retinal artery 28.7 ± 6.05 mm. Hg. Statistically a correlation between the two values existed probably because of an increase in the minute volume with increasing differential pressure. Another statistical correlation was found by the authors between rate of the differential pressure of both arteries and the rate of the differential and the systolic pressure of the brachial artery. This correlation is ascribed to the elastic qualities of the large arteries between the two points of measurement. (8 figures, 3 tables, 14 references)

Ernst Schmerl.

Yamamoto, Y. **Vitamin C and crystalline lens.** Acta Soc. Ophth. Japan 56:1339-1342, Dec., 1952; Ogino, S. 56:1342-1344, Dec., 1952; and Higuchi, M. 56:1345-1348, Dec., 1952.

Three authors collaborated in this series of studies. The first author reports that a rabbit lens homogenate loses a synthetic capacity for vitamin C from 2-keto-gulonic acid when the lens was made cataractous by a needling three days before removal. It recovers this capacity if a heat-inactivated extract of normal lens is added. A heat extract of a muscle has the same effect. As late as seven days after the needling, however, such a recovery can not be brought about.

The second author reports that the lens of young animals has a greater synthetic capacity for vitamin C than that of aged animals. He further states that a needled rabbit lens loses the capacity to reduce de-

hydro-ascorbic acid to vitamin C.

The third author studied the problem whether the Krebs' tricarboxylic-cycle would play a role in the vitamin C synthesis of the lens. He states that succinic acid and fumaric acid have no influence on the vitamin C synthesis. However, the synthetic action impeded by malonic acid can be recovered by an addition of fumaric acid, but not by succinic acid. He considers, therefore, that the vitamin C synthesis of the lens and the tricarboxylic-cycle may not have a direct but may have an indirect relationship.

Yukihiko Mitsui.

4

PHYSIOLOGIC OPTICS, REFRACTION, COLOR VISION

Albada, L. E. W. **Remarkable phenomena in viewing.** Acta ophth. 30:317-324, 1952.

This is a report of the observations on the phenomena of binocular vision by an amateur stereophotographer. A consideration of the data led the author to conclude that the spectacle frame fashionable to-day is illogical. He also points out that the distance sensation is of a psychologic nature, and not a special sense for distance of obstacles, as possessed by some animals. (3 figures) R. K. Daily.

Alpern, M. **Metacontrast. Historical introduction.** Am. J. Optometry 29:631-646, Dec., 1952.

Metacontrast is defined as the depression of activity aroused by a flash of light by a subsequent excitation of immediately adjacent retinal region. Its purpose is to maintain the quality of the sensory impression produced by a light moving across the visual field by removal of the after-image trail. Paul W. Miles.

Cabarrouy, Juan Emilio. **Contact lenses or precorneal lenses.** Arch. oftal. Buenos Aires 27:173-186, April, 1952.

A comparative study is made of the sclero-corneal contact lens and the corneal contact lens which has no scleral flange. The author claims the latter has many advantages over the other and lists seven advantages: 1. no liquid is used between lens and cornea, 2. the lenses are most easily inserted and removed, 3. they do not limit ocular movements, 4. they are completely invisible, 5. they lend to the eye a certain "sparkle," 6. they can be prescribed after only one to three trials, and 7. no mold of the eye is necessary. The ophthalmologist can prescribe them by indicating the exact retinoscopic findings, the lens in the trial frame which gives best vision, the horizontal diameter of the cornea in millimeters, and the exact radii of the corneal curvature to an accuracy of 0.03 mm., as shown by the ophthalmometer. Joseph I. Pascal.

Cuendet, J. F. **Psychophysic relations in ophthalmology. (The importance of geometric progression in the scale of measurements.)** *Ann. d'ocul.* 185:866-902. Oct., 1952.

After a mathematical exposition of the subject which is largely based on the law of Fechtner (sensation is proportionate to the logarithm of excitation) and the curve of Gauss, the standard measurements most frequently employed in ophthalmology are discussed in detail. These include central, peripheral and chromatic vision; the absorption of radiant energy by the ocular tissues; the comparison of two or more ocular medicaments; corneal sensitivity; and Tyndalization. For example in measuring the sense of form (visual acuity), both decimal units and common fractional units (such as 20/20 and 20/30) are more or less crude approximations of standards determined by geometric progression. The Goldman perimeter is the first perimeter in which illumination, as well as target size and

distance are spaced in geometric progression. Those who are interested in this subject should consult the original contribution because the technical phases of such a basic and complex theme cannot be briefly abstracted. (10 figures, 7 tables, 62 references) Chas. A. Bahn.

Falkowska, Zofia. **A cerebral mechanism (analysor) of binocular vision.** *Klinika Oczna* 22:195-200, 1952.

Binocular vision is the result of functioning of the higher nervous centers, whose actions are characterized by temporary associations. These can be seen in the changeable pattern of binocular vision and also in the different forms of abnormal correspondence seen in squint. Considering the influence of the cerebrum on the function and development of the organism, the author suggests that some type of training may be of help in preventing myopia. Many of the present methods of examination of binocular vision give distorted results, because of the artificial conditions of the examination. Binocular vision is influenced by the stimuli received from other parts of the organism. Practical application of these observations is seen in flying. A pilot's efficiency is greatly influenced by his general condition. (44 references) Sylvan Brandon.

Ferrario, Ezio. **The heredity of myopia.** *Rassegna ital. d'ottal.* 21:381-404, Sept.-Oct., 1952.

Ferrario discusses the laws of heredity and quotes the views of writers on this subject from 1887 to the present time. His own observations on the heredity of myopia result from the study of 350 cases of myopia, only 68 of which were appropriate for analysis. Of these 38 were in the first generation, 22 in the second, 7 in the third, and one in the fourth generation. No definite conclusions could be drawn. Eugene M. Blake.

Fry, G. A. **Psychological factors in visual acuity.** *Am. J. Optometry* 29:624-630, Dec., 1952.

Visual acuity depends on a sharp retinal image plus psychologic factors. The ability to interpret blurred retinal images can be improved by training if the test object involves form or shape. Another psychologic factor is that of attention, which affects the level of accommodation and the size of the pupil. This stimulus of accommodation changes intra-ocular pressure, which in turn affects the brightness difference threshold. Experiments on visual acuity are complicated by the fact that the eyes may not focus on the object of attention, but may over-accommodate because of the "nearness" stimulus of the instrument, or by the presence or absence of background detail. Phenomena like night myopia, and the "flashes" of clear vision in uncorrected myopic patients need study with psychological factors under control. Paul W. Miles.

Fry, G. A. **Targets and testing procedures for the measurement of visual acuity without glasses.** *Am. J. Optometry* 30:22-37, Jan., 1953.

The visual acuity without glasses depends on reliability of the subject's judgment (intelligence?), pupil size, accommodation, and the presence of astigmatism. Types of test object were studied photographically to determine which might give more consistent results in the various types of ocular ametropia and aberration. In several common test objects, certain smaller sizes may appear sharper than the identical pattern in larger size. Some test objects determine skill in interpreting blurred imagery, not the amount of blur which is objectively present on the retina. If the latter be desired, select a test object of simple form, a line or a point. Paul W. Miles.

Funder, Wolfgang. **A case of deuteranomaly with unusual fundus changes.** *Klin. Monatsbl. f. Augenh.* 121:449-454, 1952.

A 19-year-old deuteranomalous girl had numerous yellowish and reddish dots in the fundus of each eye. Two brothers of her mother are deuteranomalous. (1 figure, 1 table, 7 references)

Frederick C. Blodi.

Giglio, E. J. **Visual acuity under special circumstances.** *Am. J. Optometry* 29:647-655, Dec., 1952.

Experiments were performed on a patient with -8.00 diopters of myopia, who could at times and under considerable effort read 20/25 letters without glasses. Paul W. Miles.

Gleiss, J., and Pau, H. **The development of the refraction before birth.** *Klin. Monatsbl. f. Augenh.* 121:440-445, 1952.

The authors retinoscoped 23 premature children in bi-weekly intervals. The trend to hyperopia develops during the last two months of gestation. No case of retrolental fibroplasia was observed, but only two of the children had a birth weight below 1,500 gm. (2 tables, 13 references) Frederick C. Blodi.

Graff, Th. **Accommodation through a reading glass.** *Klin. Monatsbl. f. Augenh.* 121:205-215, 1952.

The author calculated the curves which indicate the relation between refractive value of glasses, the distance between eye and object and the effort of accommodation. The mathematical derivations are given and the practical uses of the curves are indicated. (8 figures, 7 references)

Frederick C. Blodi.

Graybiel, Ashton. **Oculogravic illusion.** *A.M.A. Arch. Ophth.* 48:605-615, Nov., 1952.

This is a report of studies conducted on normal adults exposed to centripetal acceleration on a human centrifuge. The oculogravic illusion is the impression that one is being tilted and moved in space and that objects in the visual field move when one is subjected to a change in the resultant force relative to himself as can be produced in aircraft and in the human centrifuge. The author believes that this illusion is independent of retinal function and ocular movement and that it is related to a "psychophysiological integration that allows for the perception of movement which may be incidental to our space perception ability." (2 figures, 15 references)

George S. Tyner.

Gumbel, E. J. **A study of depth perception in the light- and dark-adapted eye.** *Am. J. Optometry* 29:613-623, Dec., 1952.

Monocular and binocular tests of depth perception of five normal subjects were made on a modified Howard two-rod instrument in light and dark adaption. Fifty settings of the two rods were discriminated, from which in the light, 33 were correct monocularly and 47 binocularly. In the totally dark-adapted condition, 29 were correct monocularly, and 33 binocularly. Depth perception in the dark is rudimentary and inferior.

Paul W. Miles.

Györfy, I. **Results with contact lenses: a comparative statistical study.** *Acta ophth.* 30:329-336, 1952.

This is an analysis of 450 contact lens cases relative to sex, age, occupation, percentage of patients wearing their lenses for sports, ocular condition for which contact lenses were ordered, the number of years the lenses were worn, results of previous examination for suitability, the number of hours tolerated during one day, the patients' opinion of contact lenses, and the type of lenses worn. The data show

that 20 percent were fitted monocularly; men were in the majority; the youngest patient was nine years old, the oldest 80; most of them were between 21 and 40 years old. The majority of the patients were myopes. Patients with keratoconus formed 10 to 20 percent of the group. Because of the careful preliminary examination for suitability for contact lenses, with due consideration of the physical and neurotic factors, only a few patients had given up wearing their contact lenses. Most lenses were prescribed for visual improvement, and a few for cosmetic reasons. Fifty percent of patients wore their lenses continuously for four to eight hours, and 25 percent longer than eight hours. The contact lenses prescribed were individually fitted acrylic lenses, the form of which was determined by a haptic shell selected from a trial set. The lens was a transition between a glove-fit and tangent cone; they fit approximately exactly to the eyeball, but the pressure of the haptic part is not even; it is maximal 2 to 3 mm. from the limbus and diminishes equally toward the limbus and the edges. (14 tables, 11 references)

Ray K. Daily.

Hamburger, F. A. **The role of binocular rivalry in stereoscopy and stereoscopic measurement of distances.** *Arch. f. Ophth.* 153:57-82, 1952.

During world wars I and II the armies used stereoscopic instruments for the measurement of distances. Hamburger was an ophthalmic consultant to military schools which taught the use of this equipment. He started to investigate the role of several factors when he noticed how many persons with normal depth perception were unable to acquire the skill necessary for satisfactory distance measurements. An angle of 6" to 16" was considered to represent the normal limit of depth perception, as an angle of 40" to 60" represents the minimum separable

in the usual tests for visual acuity. 69 persons who did not pass the military course, and 39 who did were examined in the following ways: 1. general examination of the eyes, 2. haploscopic tests for form and color, 3. haploscopic tests for color only, and 4. haploscopic tests with test objects of varying sizes. The frequency of rivalry varied in different people from 0.5" to about 10.0". Those who passed the course showed a rather rapid frequency of rivalry of the haploscopic picture, the failures showed a slow frequency. The tendency to mix the haploscopic pictures was found greater where the frequency of rivalry was slow. Some of the failures were unable to fuse small objects haploscopically. Changing dominance of the eyes was also noticed in some of the failures. The most important conclusion drawn from these findings is probably the author's statement that normally a true fusion of a monocularly seen picture does not occur. Rapid rivalry makes the images of the double eye act successively, thus stimulating awareness for slightest differences in the positions of the two monocularly seen objects. (3 figures, 9 tables, 29 references)

Ernst Schmerl.

Jaeger, A. **The binocular refraction.** *Klin. Monatsbl. f. Augenh.* 121:485-487, 1952.

The author ascribes the more hyperopic refraction found in binocular testing to the association with convergence which regulates the accommodation. (5 references)

Frederick C. Blodi.

Jaeger, W., and Kroker, K. **The stimulation of deuteranopes and protanopes by large areas.** *Klin. Monatsbl. f. Augenh.* 121:445-449, 1952.

Nagel had already maintained that deuteranopes and protanopes have a normal trichromatic color perception if the stimulating area is large enough, that is, more than 10 degrees. Sixteen students

with defective color vision were examined. It was found that two-thirds of the protanopes, but only two-sevenths of the deuteranopes have a trichromatic vision when their stimulation area is increased. These patients should be classified as protanomalous and deuteranomalous. (3 references)

Frederick C. Blodi.

Jaeger, Wolfgang. **The influence of exposure time on the minimum separabile.** *Klin. Monatsbl. f. Augenh.* 121:340-345, 1952.

The author used the two-light method of Tonner. By this method the distance of the two lights, their brightness and the exposure time can be varied. The increase in distance alone reduces the exposure time only to a third of the unlimited exposure time of the minimum separabile. (4 figures, 6 references)

Frederick C. Blodi.

Kirschen, M. **Fusion—its loss and return—a case report.** *Am. J. Optometry* 30:19-21, Jan., 1953.

Stereopsis in a patient aged 54 was interrupted four years by an intraorbital meningioma, but was resumed after surgery.

Paul W. Miles.

Lisch, K. **Remarks on Comberg's paper on the etiology of myopia.** *Klin. Monatsbl. f. Augenh.* 121:223-224, 1952.

The author refutes Comberg's statement (*Klin. Monatsbl. f. Augenh.* 119:179, 1951) that he did not recognize the importance of the scleral ectasia during embryonal life for the etiology of myopia. This factor was especially emphasized by the late Sondermann. Frederick C. Blodi.

MacLachy, R. S. **Color vision testing.** *Tr. Ophth. Soc. U. Kingdom* 71:623-629, 1951.

Because of variation in normal color vision, the author suggests a classification based on average color vision. Subjects

who differ from this may be classified as having defective color vision. He also recommends that all school children be tested by the age of ten years.

Beulah Cushman.

Olson, H. C., Mitchell C. C., and Westberg, W. C. **The relationship between visual training and reading and academic improvement.** *Am. J. Optometry* 30:3-13, Jan., 1953.

Of 49 college students making just passing grades, 15 were given 24 forty-five-minute sessions of visual training of various types over an 8-week period, depending on their apparent needs. Fourteen were given such visual training plus counseling, while 13 had only the counseling. A control group of 7 merely took the reading tests at the beginning and at the end of the period. The trained subjects showed significant gain in reading rate, but only slight gain in comprehension, compared with the controls.

Paul W. Miles.

Otsuka, J., and Kanefuji, M. **Influence of acetic acid and bromtetra-ethyl-ammonium on the refraction.** *Acta Soc. ophth. Japan* 56:1358-1360, Dec. 1952.

An acidosis is thought to be one of the causes of acquired myopia. In infantile rabbits, prolonged subconjunctival injection of 1/200 N acetic acid for 59 to 249 days resulted, however, in a shortening of the axis of the eyeball and hyperopia. A similar experiment using brom-tetra-ethyl-ammonium did not cause any changes in the length of the eyeball.

Yukihiko Mitsui.

Pascal, J. I. **A note on color vision.** *Am. J. Optometry* 30:38-40, Jan., 1953.

The statement that color sensation depends on wave length is incorrect, in that red of 600 millimicrons wave length still appears red after passing through vitreous in which its wave length has changed to

450. Color depends on frequency which remains constant.

Paul W. Miles.

Pau, H. **The factors operative in accommodation.** *Ophthalmologica* 124:239-253, Oct., 1952.

This is a graduate lecture on the mechanism of accommodation with the stress on the author's original contributions to the subject. The forces operative in accommodation are located partly in and partly outside the lens. The former are 1. the extension and the elasticity of both the anterior and the posterior capsule; 2. the colloid-osmotic pressure of the lens proteins and 3. the gradually increasing sclerosis of the lens. The extralenticular factors are 1. the pull exerted by the zonula (which, in turn, is dependent upon the extensibility of the zonule, the power of the ciliary muscle and the opposing elasticity of the choroid), 2. the change in the position of the vitreous, and 3. the change in position of the refracting lens surfaces. Direct measurements have shown that the posterior lens capsule is more extensible, under the influence of the same weight, than the anterior lens capsule. The colloid-osmotic pressure of the lens proteins have been measured to be between 850 and 1,000 mm. water. By direct measurement the zonule has been found more extensible than the posterior lens capsule. During the process of accommodation the pressure in the vitreous drops a little; during the return of the accommodative mechanism to the resting state the pressure in the vitreous rises again. The author arrived at this conclusion from the close (biomicroscopic) observation of cases with small vitreous prolapses into the anterior chamber through gaps in secondary (post-cataract) membranes. The increase in lens curvature during accommodation can, accordingly, not be due to vitreous pressure. On the contrary, the peripheral flattening of the lens during relaxation of accommodation is partly due to vitreous

pressure. The principles of the process of accommodation can be demonstrated by means of a moderately inflated rubber balloon (representing the lens), approximately two fifths of which have been reinforced, that is made less extensible, by a second layer of rubber. Strips of elastic material attached to the "equator" of this model lens represent the zonule. Such a model permits the demonstration and the analysis of the most important factors in accommodation, namely, the different degrees of extensibility of the capsule and zonule. (6 figures, 3 tables)

Peter C. Kronfeld.

Pau, H. **Intracapsular accommodation.** Klin. Monatsbl. f. Augenh. 121:224-226, 1952.

On the basis of some experiments on young mammalian lenses the author concludes that the intracapsular mechanism (Gullstrand) is of no importance for the increased refractive power of the lens during accommodation.

Frederick C. Blodi.

Segal, Pawel. **Adaptation in squint.** Klinika Oczna 22:201-210, 1952.

The author investigated the function of the periphery of the retina in squinting eyes. The adaptometer of Carle (Swedish) was used and 24 subjects with squint and 15 controls were examined. Adaptation was equal in both eyes regardless of the degree of amblyopia. Binocular summation was not noticed in either of the examined groups. Stimulation of an eye adapted to darkness with a weak light did not influence the adaptation of the other eye in strabismus. In subjects with normal eyes there is a definite influence of one eye on the other. The process of adaptation to darkness depends on the condition of the peripheral organ and the cortical centers. (5 figures, 16 references)

Sylvan Brandon.

Vukovich, V., and Mueller, J. **Heterophoria and binocular vision.** Arch. f. Ophth. 153:83-92, 1952.

The reader is reminded of the findings reported in a former study. Panum areas and the binocular field of fixation for central vision are of the same magnitude of 5' to 6'. The area of central fixation of the single eye is of the same order. In exophoria the central Panum areas were found larger on the nasal side of the retina, in esophoria larger on the temporal side. Objects are seen flat and single where corresponding retinal elements within the Panum areas for both eyes are stimulated. Stereovision occurs where the light impinges upon horizontally disparate retinal elements within the Panum areas. The horopter is considered the geometric locus of all objects which are pictured by corresponding functional units of the retinas. The differences in position of the central Panum areas in exophoria and in esophoria suggested the study of the following problems: 1. are the same differences found in peripheral vision?, 2. is a change in the shape of the horopter involved due to the aforementioned factors?, 3. is the hypothesis of a fixed retinal correspondence compatible with the observation that experimental changes of heterophoria change size and position of the Panum areas with respect to the central fovea?

These questions were studied with the help of stereoscopic methods and the authors found: 1. differences for peripheral vision corresponding to those observed for central vision; 2. no relation of the shape of the curve of the horopter to the type of heterophoria; 3. the retinal correspondence varying in persons in whom experimental changes from one kind of heterophoria to the other were produced.

The conclusion is reached that the so-called retinal correspondence should refer to functional units of the size of the Panum areas. Imagery outside corresponding Panum areas produces double

vision. Stereoscopic impressions develop when binocular parallax within the corresponding Panum areas of the two eyes occurs and an adequate stimulus is produced in area 17 of the cortex. (4 figures, 3 tables, 8 references) Ernst Schmerl.

5

DIAGNOSIS AND THERAPY

Andren, Signe. **A study on the value of antibiotic and chemotherapeutic agents in chronic diseases of the eye.** *Acta ophth.* 30:281-302, 1952.

The material of this report comprises 36 cases of clinical ocular tuberculosis. The therapeutic agents used were streptomycin, dihydrostreptomycin, Pas, sulfadital, aureomycin and chloromycetin. Five patients recovered, in eight there was decided improvement, in three there was no effect or deterioration, and in 20 the improvement was doubtful. Long standing and severe cases which failed to respond to other therapy were on the whole refractory to this type of therapy also. The response was favorable in recent cases. In diseases which were nontuberculous this type of therapy was of no benefit. This study does not present data on the comparative effectiveness of the therapeutic agents used. (3 tables, 37 references)

Ray K. Daily.

Arkin, Wiktor. **Magnification of the direct image of the fundus obtainable with the ophthalmoscope.** *Klinika Oczna* 22: 211-218, 1952.

Varying magnifications of the image of the eyegrounds in direct ophthalmoscopy can be obtained by using a special optical attachment to the ophthalmoscope. This attachment is built on the principle of the Galilean telescope. A few diagrams are presented to illustrate magnifications obtained with various lenses. (19 figures)

Sylvan Brandon.

Barraquer Moner, José-Ignacio. **The use of curare in ocular surgery.** *Arch. d'opht.* 12:477-486, 1952.

The author discusses the role of curare in ocular surgery and notes its great value in preventing surgical accidents, principally loss of vitreous. Its use has made keratoplasty possible on aphakics without any loss of vitreous whatever. He describes three methods for the use of curare in association with local anesthesia; 1. the method of Kirby who advocates curare as a supplement to sedatives and local akinesia when their action is inadequate; 2. the author's method, in which curare is the only akinesia-producing agent; and 3. the author's method for familiarizing the surgeon with curare by means of small doses used systemically as a complement to the sedatives and akinesia customarily employed. He considers myasthenia gravis the only absolute contraindication to curare. In case of overdosage he used prostigmine as an antidote. He has used curare as the sole akinesia agent in more than 1,000 cases without accident. (8 references)

Phillips Thygeson.

Bedrossian, R. H., and Deichler, J. W. **Phenylephrine (neo-synephrine) ointment.** *A.M.A. Arch. Ophth.* 48:747-748, Dec., 1952.

A new vehicle for 10-percent ophthalmic neosynephrine is introduced. It is superior to existing preparations because it is less irritating and does not deteriorate. (3 references)

G. S. Tyner.

Belz, A., Sohler, R., Montabone, H., and Juillard, J. **The Middlebrook-Dubos type of hemo-agglutination in ocular tuberculosis. The results of our 500 first reactions.** *Ann. d'ocul.* 185:805-809, Sept., 1952.

This test is based on the specific agglutination of red cells which are impregnated with antigen obtained from tubercle bacilli, when they are in contact

with blood serum containing tuberculous antibodies. The technical details were described in the July, 1951, number of this journal. In 60 clinical cases of ocular tuberculosis including anterior and posterior uveitis, sclerokeratitis, retinal periphlebitis, keratitis, and choroiditis, 72 percent were positive. In 300 cases of clinically nontuberculous ocular disease such as trachoma, chalazion strabismus and trauma of different types, only 4 percent were positive. Because of the simplicity, reliability and easy performance of this test, the authors conclude that it is superior to other blood tests in ocular tuberculosis.

Chas. A. Bahn.

Benton, Curtis D., Jr. **Incidence and diagnostic value of the ocular fundus lesions in hospitalized medical patients.** *Am. J. M. Sc.* 224:554-558, Nov., 1952.

Five hundred nearly consecutive patients admitted to the medical wards of a general hospital were subjected to a complete ophthalmoscopic examination of the ocular fundi after pupillary dilatation. The main purpose of the survey was to find the incidence of defects of the fundus in these medical cases and the value of this ocular information in the establishment of the diagnosis of the disease found. In 222 patients the fundus was normal. In 203 others lesions were present which bore a direct or indirect relationship to the medical disease. In the other 19 patients the abnormalities were local ocular disease. The ophthalmologist correctly estimated the blood pressure range in 56 of the 81 patients with hypertension by evaluating the changes in the retinal arterioles in the light of Keith and Wagener's studies.

F. M. Cragg.

Berens, Conrad. **New quadrifocal spectacle for the presbyopic ophthalmologist.** *A.M.A. Arch. Ophth.* 48:632-633, Nov., 1952.

A quadrifocal spectacle is described

which may be useful to ophthalmologists. The lowest segment provides clear vision at 10 inches for surgical procedures. (1 figure, 2 references) George S. Tyner.

Berens, Conrad. **Corneal transplantation.** *A.M.A. Arch. Ophth.* 48:634-635, Nov., 1952.

A plastic moist chamber is described for donor eyes which facilitates handling of the donor graft complete with sutures. (3 figures 3 references)

George S. Tyner.

Bischoff, Hildergard. **Tissue therapy after Filatow.** *Ophthalmologica* 124:89-99, Aug., 1952.

After a review of the literature the author reports on her experiences with subconjunctiva implantation of human placenta in 90 patients with various prognostically unfavorable ocular diseases. The visual acuity before and after the treatment was chosen as the criterion of the therapeutic effect. How the visual acuity was tested and to what extent changes in refraction or other factors could have accounted for some of the acuity changes observed, the author does not state. In about 10 percent of the cases of senile degeneration of the macula, definite improvement was recorded. Similar results were observed in cases of choroiditis or optic atrophy. Considering the unfavorable prognosis of the diseases in which tissue therapy was used "even the slightest improvement or slowing-up of a progressive disease means a great deal to the patient." The treatment is being continued. (30 references)

Peter C. Kronfeld.

Brand, I. **A new instrument to assist in intracapsular cataract extraction through a round pupil.** *Ophthalmologica* 124:108-111, Aug., 1952.

The working part of this instrument, called iris elevator, is a miniature edition

of a lid retractor which serves to retract the upper iris sector safely and effectively during the passage of the lens through a round, not too well dilated pupil. (2 figures, 4 references) Peter C. Kronfeld.

Bukowinska-Chomiczewska E. **Serum of Bogomolec in eye diseases.** *Klinika Oczna* 22:137-140, 1952.

Cytotoxic serum of Bogomolec was used in 40 cases of various ocular disease: in 16 patients the eye healed, in 18 improved and in 6 there was no improvement; 3 to 4 subcutaneous injections were given every third day. The series of injections were repeated only in two cases. The same serum is used in France under the name of serum ortobiotique. It is prepared by vaccinating an animal with an extract of a reticulo-endothelial type of human tissue. (2 tables, 3 references)

Sylvan Brandon.

Chavira, Raul A. **Changes of the pressure of the central retinal artery.** *An. Soc. mex. de oftal.* 24:139-155, July-Sept., 1950.

Yanes used the term "retinodynamometry" to determine the studies of pressure of the central retinal artery. It provides the oculist, the internist, the cardiologist, and the neurosurgeon with a means of diagnosis and prognosis of cardiovascular diseases. The method used is as follows: the ocular tension is determined first with the Schiøtz tonometer (7.5 gram weight); then under direct observation of the retinal artery the globe is compressed with the Bailliart dynamometer. The diastolic blood pressure is read when the first arterial pulsation is observed and the systolic when the pulse disappears. The figures obtained are converted into intraretinal pressure by using the tables of Bailliart, or the intraocular pressure is taken at the height of the compression. Retinal hypertension accompanied by general hypertension is found in luetic retinitis and diabetic retinopathy. Retinal hypertension with

normal blood pressure is seen in hemorrhagic retinitis, increased intracranial pressure, and in blockage of the intertricular circulation. Retinal hypotension is seen in arteritis obliterans, certain types of choroiditis and aneurysms of the ophthalmic artery. Pulsations of the central retinal artery may signify glaucoma, severe anemia, embolus of the vessel or certain types of retrobulbar tumor. (63 references) Jose Pietri.

Cook, Charles. **A preliminary review of the effects of cortisone in inflammatory conditions of the cornea and sclera.** *Tr. Ophth. Soc. U. Kingdom* 71:487-498, 1951.

Cortisone was found to play a useful role in relief of long-standing chronic conjunctivitis of unknown etiology and also in spring catarrh. Many of the inflammatory ocular conditions heal spontaneously, but the inhibition of the inflammatory process by use of cortisone during the time of activity may prevent possible destruction of essential tissue. (3 figures)

Beulah Cushman.

Deutsch, E., and Zwiauer, A. **The possibility of dissolving fibrin clots in the anterior chamber of the eye.** *Arch. f. Ophth.* 153:163-168, 1952.

The authors tried several substances in experiments with rabbits. 10,000 units of streptokinase injected into the anterior chamber inhibited the formation of fibrin or dissolved clots of fibrin rather rapidly. No damage to the eye could be observed. (23 references) Ernst Schmerl.

Fleck, M. **Experiences with skin tests in ophthalmology.** *Klin. Monatsbl. f. Augenh.* 121:306-312, 1952.

Of 80 patients with a suspected allergic conjunctivitis who were tested for various allergens, 48 gave a positive reaction to one or the other of the skin tests.

Frederick C. Blodi.

François, J., and Moens, R. **A new electronic tonometer.** *Ann. d'ocul.* **185**: 772-778, Sept., 1952.

The instrument consists essentially of a plunger or piston, one end of which is in contact with the cornea and the other end in the field of an electromagnet. The distance from the electromagnet determines the tension. The tonometer is in a housing on one end of the counter-weighted lateral arm which is balanced on a vertical stand with a heavy base. The entire stand, including the tonometer, is placed at the head of the examining table and lowered to the examined eye. The instrument is apparently not as flexible as the electronic tonometers used in this country. (5 figures) Chas. A. Bahn.

Giggilberger, Hans. **Principles of X-ray diagnosis of the skull.** *Klin. Monatsbl. f. Augenh.* **121**:385-397, 1952.

This is a concise and well illustrated survey of information on the normal X-ray picture of the skull, its anatomical basis and its physiologic variations. The orbit, the paranasal sinuses and the sella are discussed in detail. (18 figures, 3 references) Frederick C. Blodi.

Grant, W. M. **An iodine-vapor applicator for treatment of dendritic keratitis.** *A.M.A. Arch. Ophth.* **48**:749-751, Dec., 1952.

The author describes a device for treating herpetic lesions of the cornea with iodine vapor. It consists of a glass applicator filled with iodine crystals. The glass device may be obtained from the Corning Glass Works, Corning, N.Y. (3 figures) G. S. Tyner.

Havener, W. H., and McReynolds, W. U. **False scotomas associated with high uncorrected refractive errors.** *A.M.A. Arch. Ophth.* **48**:616-619, Nov., 1952.

A central scotoma almost invariably

appears under cycloplegia in patients with uncorrected ametropia of three diopters or more in whom it is sought for by moving a small test object out from under a fixation target. This false scotoma can be avoided by having the patient wear correcting lenses, by utilizing a black pin for a fixation target, or by using both maneuvers. (3 tables) George S. Tyner.

Heinsius, Ernst. **A new blepharostat for cataract extraction.** *Klin. Monatsbl. f. Augenh.* **121**:71-72, 1952.

The blepharostat has its connecting arch on the nasal side. This facilitates the incision with the knife from the temporal side. (2 figures) Frederick C. Blodi.

Jaeger, Wolfgang. **The depth of the anterior chamber measured with parallel glass plates.** *Arch. f. Ophth.* **153**:120-131, 1952.

An apparatus described is intended to serve as an accessory to the Zeiss-Opton slitlamp and microscope. Measurements are said to be easily performed with an error of about ± 0.02 mm. (7 figures, 1 table, 17 references) Ernst Schmerl.

Jensen, H. **The Moeller refractor.** *Klin. Monatsbl. f. Augenh.* **121**:72-76, 1952.

This is a description of a simplified hydraulic refracting unit combined with a projector. (3 references) Frederick C. Blodi.

Lanchner, A. J. **Headache in ophthalmic practice.** *Neurology* **2**:471-476, Nov.-Dec., 1952.

The author describes his findings in 3,216 consecutive office patients, 51 percent of whom were men, and 49 percent women; 355 complained of headache. The incidence among women was 16.6 percent greater. The peak patient load was in the fifth decade, but the peak headache group was in the fourth decade; 184 had objective evidence of ocular disorders; 88 astig-

matism, 28 presbyopia, 14 hyperopia, 7 overcorrection of refractive error, and 39 had muscular imbalance. There were 171 patients who complained of headache, but had no ocular findings. Of these, 64 showed no cause, 57 had emotional tension, 16 migraine, and 16 sinusitis. In the group with ocular findings, the headache was in the frontal region in 86 percent; in the nonocular group it was in the frontal region in 53 percent, in the occipital in 20 percent, the temporal in 11 percent, over the entire head 8 percent, and at the vertex 7 percent. Almost all the patients in the series had ocular disturbances, yet only 5 percent of the group had headache combined with ocular signs. (4 tables, 7 references)
Harry Horwich.

Leonhardt, V. A. **Herxheimer reaction or allergy to penicillin?** *Klin. Monatsbl. f. Augenh.* 121:292-297, 1952.

A 34-year-old man with a chronic iridocyclitis and a positive serologic reaction of syphilis developed glistening dots in the fundus and sheathing of the retinal vessels shortly after treatment with penicillin had been started. (1 figure, 20 references)
Frederick C. Blodi.

Loehlein, Walther. **A new device for the protection of the lens in perforating keratoplasty.** *Klin. Monatsbl. f. Augenh.* 121:129-133, 1952.

The author devised a curved spatula which is introduced into the anterior chamber from the limbus. It is held against the posterior corneal surface while the trephine is applied. It can be used even in cases of extensive anterior synechia or hypotony of the globe. (2 figures)
Frederick C. Blodi.

Meyer, S. J., and Schall, S. **The use and abuse of ointments in eye diseases.** *Postgrad. Med.* 12:552-557, Dec., 1952.

Most eye ointments contain no preservative and sterility is imperative. The

patient should be instructed how to put the ointment into the cul-de-sac and not on the lid margin where sensitization to the drug may occur. Ointments are contraindicated immediately after cataract extraction, after plastic procedures around the lids where maceration of the skin graft may occur, in moist, open, or weeping inflammatory skin lesions, and in corneal wounds where healing may be inhibited. The use of ointments in the treatment of blepharitis, conjunctivitis, lesions of the cornea, iridocyclitis and glaucoma is briefly commented upon.

Irwin E. Gaynon.

Nano, Hector M. **A new bistoury (knife) in ocular surgery.** *Arch. oftal. Buenos Aires* 27:14-16, Jan., 1952.

The author describes a bistoury with a changeable blade and other refinements which enable the operator to gauge the depth of the incision. It is especially useful in the surgery of the cornea and sclera. (4 figures)
Joseph I. Pascal.

Nover, A., and Jaeger, W. **A colorimetric method of measuring the flow of tears.** *Klin. Monatsbl. f. Augenh.* 121:419-425, 1952.

Many of the usual methods for measuring the flow of tears are irritating to the eye and therefore not entirely reliable. The author instills one drop of a 2-percent fluorescein solution into the conjunctival sac. After two minutes the color of the conjunctival fluid is compared with standard dilutions. (2 figures, 15 references)
Frederick Blodi.

Reiser, K. A. **Studies on sulfonamide therapy.** *Klin. Monatsbl. f. Augenh.* 121:257-270, 1952.

Local administration of a sulfonamide by simple instillation and corneal baths did not give any appreciable concentration of sulfonamide in the interior of the eye. When the drug is given with an

emulsifier the absorption increases 2 to 4 times. Still higher levels can be obtained if prisol is given at the same time. (9 figures, 33 references)

Frederick C. Blodi.

Robbins, Milton H. **Bell's palsy successfully treated with cortisone.** A.M.A. Arch. Ophth. 48:696-697, Dec., 1952.

A 45-year-old white woman with facial nerve paralysis of unknown etiology was treated with oral cortisone nine days after onset of the disease. Improvement was noted within 24 hours and continued throughout a 12-day course of treatment. (1 table, 1 reference) G. S. Tyner.

Stepanik, J. **A new instrument for goniotomy.** Klin. Monatsbl. f. Augenh. 121:480-485, 1952.

The author describes an ingenious new instrument which enables one to inject air into the anterior chamber while performing goniotomy. (2 figures, 9 references)

Frederick C. Blodi.

v.d. Tweel, L. H. **Pupillography.** Nederl. tijdschr. geneesk. 96:3035, 1952.

A method is described in which an image of the pupil is projected on a slit behind which a film is moved. The reactions of the pupil are photographed in dark blue or dark red light.

G. H. Jonkers.

Warren, C. M., Jr. **Local treatment of eye infections with gantrisin.** South. M. J. 45:1183-1184, Dec., 1952.

Over 1,000 patients were given therapy with 4-percent gantrisin ophthalmic solution and 4-percent gantrisin ophthalmic ointment for the treatment of conjunctivitis, blepharitis and secondary keratitis. The response has been unexcelled and the absence of stinging and burning make these preparations of particular value. (6 references) Irwin E. Gaynon.

Wegman, T., and Gut, A. **Ocular toxoplasmosis in adults.** Klin. Monatsbl. f. Augenh. 121:463-472, 1952.

At the clinic in Zurich 20 patients with chronic uveitis were tested for toxoplasmosis. Only in one case were the complement fixation and the dye test positive. The difficulties of a clinical diagnosis of toxoplasmosis are emphasized and the author uses sound criticism on the numerous reports by German and Austrian clinicians on adult toxoplasmosis which was diagnosed on the basis of meager and inconclusive evidence. (3 figures, 2 tables, 18 references) Frederick C. Blodi.

Weinstein, P. **Therapeutic results of ciliary ganglion blocks.** Ophthalmologica 124:228-239, Oct., 1952.

In the "pathophysiological" introduction of his paper the author expounds a theory which assigns the principal role in all pathologic processes to the nervous system (Speransky, A. O., Grundlagen einer Theorie der Medizin, Springer, Berlin 1950). The salient concepts of the theory are: 1. unity within the nervous system whereby is meant accessibility of all its parts to an impulse arising within any of its parts; 2. physiologic trophic effects exerted by all nerves upon their effector organs; and 3. pathologic effects exerted by abnormal, pathologic impulses arising from a nerve in the state of neurodystrophia. Continuous irritation of a pathologic nature can give rise to a variety of diseases, particularly iritis. Temporary denervation by a procaine block may be of therapeutic value. That line of thinking caused the author to try ciliary ganglion blocks in a variety of ocular diseases. Satisfactory results were obtained by means of simultaneous sphenopalatine and ciliary ganglion blocks in cases of rosacea keratitis, marginal corneal ulcer and other corneal infiltrations. The combination of ciliary ganglion

block with perilimbal subconjunctival procaine block proved beneficial in suppurative iritis. The effect of ciliary ganglion block upon the response of the iris and ciliary muscle to the common cholinergic stimulants is reviewed. The permeability of the blood aqueous barrier was found unaltered during a ciliary ganglion block. The effects of the block upon ocular tension and upon the response of the eye to the darkroom test will be dealt with in detail in a subsequent publication. (2 figures, 1 table, 68 references)

Peter C. Kronfeld.

6

OCULAR MOTILITY

Cashell, G. T. Willoughby. **Duane's retraction syndrome.** Tr. Ophth. Soc. U. Kingdom 71:401-405, 1951.

Four patients with retraction of the left eye were presented to display the characteristics of the syndrome as described by Duane. This syndrome is characterized by poor abduction and adduction, retraction on adduction, upward deviation, narrowing of the palpebral fissure associated with ptosis, and a poor near point of convergence. Cashell's conclusions were that the less one did, the better, as surgical results were unsatisfactory in two-thirds of the patients owing to fibrosis of the muscles involved. Beulah Cushman.

Fischer, Hermann. **The operation of choice in esotropia.** Klin. Monatsbl. f. Augenh. 121:153-161, 1952.

The author advises conservative treatment in early childhood. For older children a guarded tenotomy (uni-or bilateral) is indicated. For children over 12 years of age, a combination of guarded tenotomy with advancement or resection is the method of choice. Age of patient, times degree of deviation, over degree of abduction, gives a factor which, to the author, is an indication for the choice of opera-

tion. If the factor is smaller than seven, a tenotomy should suffice. If the factor is larger than seven, a combined operation is necessary. The findings on 73 patients are analysed. (3 tables, 20 references)

Frederick C. Blodi.

Franceschetti, A., Monnier, M., and Dieterle, P. **Analysis of congenital nystagmus by means of electronystagmography.** Bull. schweiz. Akad. d. med. Wissensch. 8:403-412, Nov., 1952.

The authors, using the method of electronystagmography of Monnier and Hufschmidt observed the position of the eye in which the congenital nystagmus is minimal. It was found that in some patients this minimum of nystagmus occurs in corresponding positions of both eyes. In other patients, the position of the eye which corresponds to this minimum of frequency and amplitude is determined by the position of the fixing eye. In such patients the image in one eye is suppressed, and the child has more or less strabismus. The nystagmogram has uncovered a new cause of the strabismus that occurs with congenital nystagmus. (9 figures, 4 references)

F. H. Haessler.

Neely, J. C. **The effect of high altitude on ocular muscle balance.** Tr. Ophth. Soc. U. Kingdom 71:663-678, 1951.

An existing heterophoria was increased at high altitudes probably because of anoxia. In the first world war faults of ocular muscle balance were found just as frequently in good pilots as in the bad. Twenty-two years later no correlation was found between the landing errors of 175 student pilots and their exophoria or esophoria. After more extensive study the author concludes that orthoptic exercises produce no lasting amelioration and the effects of operative treatment are not always permanent. The nervous control of fusion is impaired by anoxia, by anxiety,

fatigue and alcohol. Convergence and adduction decreased in half of the cases, accommodation decreased in all except two. (5 figures, 2 tables, 16 references)

Beulah Cushman.

Nonnenmacher, Heinz. **The symmetrical and equal advancement and recession operation of Kunz.** *Klin. Monatsbl. f. Augenh.* 121:161-168, 1952.

In 1949 Kunz reported on his combination of equal advancement and recession. The author compares 71 cases operated according to the method of Kunz with 71 cases operated according to the old method (tenotomy plus advancement). He found no superiority in Kunz's technique. (4 tables, 11 references)

Frederick C. Blodi.

Nutt, A. B. **Congenital paresis of the muscles used in elevation of the eye.** *Tr. Ophth. Soc. U. Kingdom* 71:389-400, 1951.

The author presents patients with anomalies of elevation and records pictures before and after the correcting surgery. Hess charts are also reproduced. (8 figures)

Beulah Cushman.

Salas-Oliver, P. **The rôle of occlusion in the treatment of strabismus.** *Arch. y Mem. Soc. oftal. del Litoral* 4:135-147, 1951.

The author emphasizes the fact that amblyopia results not only from disuse but also from an arrest in the development of central vision. He recalls the notion, established by Chavasse, that vision in an amblyopic eye cannot be expected to improve beyond the point reached at the time suppression set in, unless treatment is started very early, when the consequences of both lack of use and underdevelopment may still be corrected, and when the establishment of an abnormal retinal correspondence can be prevented. Occlusion must be total and permanent. As a rule, training of the amblyopic eye is necessary; visual progress must be

checked every two weeks; occlusion should be carried on for as long as recovery proceeds.

Finally, the author reports his personal experience with occlusion performed in a most orthodox way. In 15 (48 percent) out of 31 cases vision was restored to normal standards; in 14 (45 percent), recovery was only partial; in 2 (7 percent), no improvement was noticed.

A. Urrets-Zavalía, Jr.

Toselli, C. **Clinical and experimental investigation of vertical divergence as related to Hertwig-Magendie's skew deviation.** *Boll. d'ocul.* 31:593-612, Oct., 1952.

This comprehensive study contains the following chapters: definition; literature and historic review with particular attention to the localization of the central lesion causing this unusual motility anomaly; description of two patients with Ménière's disease and showing vertical deviations after diathermy coagulation of one labyrinth (the deviation amounted to 1 delta in one, and to 6 delta in the other case and disappeared again after 7 and 40 days respectively); labyrinth stimulation by rotation and heat in normal individuals causing vertical deviations of between 0.75 (heat) and 1.50 delta (rotation); vertical deviation produced by head tilting of normal subjects (transient deviations of 0.50 delta were observed); review of literature on animal experiments and personal experiments on guinea pigs subjected to destruction of one labyrinth followed by severing of one cerebellar peduncle (by curare administration the deviation could be abolished but larger curare doses were needed as compared to those suppressing the normal tonic labyrinth reflexes). (64 references)

K. W. Ascher.

Urist, Martin J. **Simulated divergence paralysis.** *A.M.A. Arch. Ophth.* 48:581-595, Nov., 1952.

Cases are presented with paralysis of one or both lateral rectus muscles, which, after a period of time, resembled supranuclear palsies rather than isolated sixth nerve palsies. Two cases are offered as clinical evidence of a separate accommodative function for distance and near. (9 figures, 13 references)

George S. Tyner.

7

CONJUNCTIVA, CORNEA, SCLERA

d'Andrade, Lopes. **Ocular inflammatory lesions of infancy.** *Arq. portug. de oftal.* 4:59-74, 1952.

The outstanding symptom in inflammatory lesions in the anterior segment of the child's eye is most often redness, or "pink eye." There are three conspicuous types of such lesion: conjunctivitis neonatorum, the scrofulous ocular syndrome, and xerophthalmia. The numerous other affections, such as dacryocystitis, forms of acute conjunctivitis, and exanthemata which involve the conjunctiva also occur frequently, but are excluded from the discussion. (7 figures, 10 references)

James W. Brennan.

Bamert, Werner. **Etiology and treatment of corneal ulcers.** *Klin. Monatsbl. f. Augenh.* 121:271-283, 1952.

This survey of the serpentine ulcers observed within the last 25 years in Basel shows that the incidence has not decreased. Three groups are compared: in the first (1914-1940) the eyes were treated with optochin and silver; in the second (1941-1945) with sulfonamides, and in the third (1948-1950) with penicillin only. The results in the third group were by far the best. Most interesting was the change in the relative frequency of the causative organisms. The incidence of pneumococcus decreased from 65 percent in the first group to 20 percent in the 1948-1950 period; that of staphylococcus increased

during the same time from 20 to 45 percent. (8 tables, 26 references)

Frederick C. Blodi.

Baron, H. G., and Saba, J. **Terrien's disease.** *Arch. oftal.* Buenos Aires 27: 116-120, March, 1952.

A 42-year-old patient had all the clinical characteristics of a marginal corneal dystrophy, known as Terrien's disease. The slitlamp showed that the corneal thickness was reduced to one-fourth normal in the region of the ectasia. Vision was reduced to the ability to count fingers at two meters. No improvement whatever followed treatment with vitamin B₁ (100 mg.) and vitamin E (50 mg.) daily for a period of one month. Joseph I. Pascal.

Boehringer, H. R. **Scleromalacia as a symptom of a severe sepsis.** *Klin. Monatsbl. f. Augenh.* 121:473-479, 1952.

A 53-year-old man with a severe sepsis of unknown etiology died after 10 months. Two months after the illness began scleromalacia developed in both eyes. The histologic examination revealed that only the anterior segments were involved. The process started with vascular changes in the episclera. Necrosis and sequestration of scleral lamellae followed. This case can be regarded as an instance of true perforating scleromalacia, which leads to scleral defects without real inflammation or pain. It must be differentiated from the nodular necroscleritis of Franceschetti and Bischler, from the scleromalacia with porphyrinuria of Malbran and from benign paralimbal scleromalacia. (7 figures, 12 references)

Frederick C. Blodi.

Borioni, D., and Scassellati-Sforzolini, G. **The action of paraminobenzoic acid, histidine and cortisone on the success of corneal transplants.** *Boll. d'ocul.* 31:623-631, Oct., 1952.

Rabbits weighing about 2 kg. were sub-

jected to corneal trephination using Franceschetti's trephine for symmetrical perforating operations on both eyes. In 9 animals the discs were immediately replaced in their original site; 9 others received the transplant from the right eye in the left cornea and vice versa. In both series simple conjunctival sutures were used to hold the transplant and the lids were sutured. Penicillin was given intramuscularly after the operation and penicillin ointment before. One third of the animals were given postoperative conjunctival instillation of 10-percent paraminobenzoic acid solution four times daily; another third, five-percent histidine ointment twice a day and the rest one-percent cortisone solution four times a day. Treatment was given only to the left eye; the right eyes, serving as controls, received physiologic saline instillations. Both eyes were kept under atropine. In four animals treated with PABA the transplants remained clear for at least two months, in two animals the transplant became opaque. All eyes treated with histidine ointment retained a clear transplant for two months; in one of them, a transient opacification disappeared completely. The cornea treated with cortisone showed either complete opacification (two animals), was rejected or became necrotic. In all control eyes transplantation failed completely; keratitis, uveitis and finally extensive leucomas developed. The therapeutic possibilities of PABA and histidine are stressed. (40 references)

K. W. Ascher.

Boudet, Ch. **Study of vascularization after keratotomy.** Arch. d'opht. 12:510-515, 1952.

In a comparative clinical study of 30 cataract cases, the author compares keratotomies that are combined with conjunctival flaps with purely corneal keratotomies. He concludes that strictly corneal incisions cicatrize more slowly and less

satisfactorily than those in which a conjunctival flap is maintained. The neovascularization that develops in corneal sections is slow to form and is irregular. (5 figures) Phillips Thygeson.

Diener, Fritz. **Acquired keratoglobus.** Klin. Monatsbl. f. Augenh. 121:82-84, 1952.

A patient developed a globular ectasia of both corneas during the second decade of life. This has been called "acute keratoglobus" by Verrey. The author assumes that it is caused by a weakness of Descemet's membrane. (3 figures, 6 references) Federick C. Blodi.

François, Jules. **Scleromalacia perforans, arthritis deformans and pemphigus.** Tr. Ophth. Soc. U. Kingdom 71:61-72, 1951.

Scleromalacia perforans is a necrotic affection of the scleral tissue characterized locally by the formation of real holes in the sclera and etiologically by a rheumatic polyarthritis that accompanies it. Usually bilateral, it is characterized by small areas of elevated yellowish, necrotic tissue with the formation of scleral holes as the necrotic mass is eliminated. The loss of substance varies from small to large holes and the whole area between the equator and limbus may be affected. The margins of the holes may be smooth or ragged, and several holes may become confluent. The choroid lies bare but never bulges. The conjunctiva may remain undamaged or become atrophic and the cornea may remain intact. Scleromalacia is not accompanied by pain or hyperemia. There is, at most, an uneasy feeling of pricking or burning. The disease affects only people over 50 years of age, and in persons with a severe deforming rheumatic polyarthritis or with cholesterol lipoidosis. It must be differentiated from necrotic nodular scleritis, a spontaneous single intercalary perforation without pain or inflammatory

symptoms in which the prognosis is good. Senile hyaline scleral plaques of slate gray color (1-2.0 mm.) found in front of the insertion of the horizontal muscles are rarely confusing. Treatment of scleromalacia perforans has been unsatisfactory. (4 figures, 57 references)

Beulah Cushman.

Friede, Reinhard. **The repeated keratoplasty.** *Klin. Monatsbl. f. Augenh.* 121: 134-139, 1952.

In case of an opacification of the first graft, repeated keratoplasties may be necessary. These operations may be immediate (in case of infection), early or late. (3 figures)

Frederick C. Blodi.

Gerkowicz, Kazimierz. **Modification of a manual trephine for corneal transplants.** *Klinika Oczna* 22:239-242, 1952.

A modification of Filatow's trephine is presented. It contains a hook which holds the transplant while it is being cut away from the cornea. It facilitates a complete and uniform dissection of the transplant. Stripping of Descemet's membrane is prevented and no pressure is applied on the eyeball, thus minimizing the danger of injury to the lens or of the loss of vitreous. (9 figures, 7 references)

Sylvan Brandon.

Grant, W. Morton. **New treatment for calcific corneal opacities.** *A.M.A. Arch. Ophth.* 48:681-685, Dec., 1952.

A new substance is suggested for dissolving calcific deposits in the cornea. The substance, "EDTA" is a commercial product used industrially to keep calcium and other metals in solution in unreactive form. It is known commercially as "versens" and "sequestrene." The treatment is carried out as follows. A sterile 0.01 M solution is prepared. The area to be treated is first denuded of its epithelium. The denuded area is irrigated for 15 minutes. The procedures are done in topical

anesthesia. The substance may be obtained from the Bersworth Chemical Company, Framingham, Massachusetts. The solution is prepared by dissolving 0.37 gm. of the compound in 100 ml. of distilled water and adding 0.10 gm. of sodium bicarbonate. It may be sterilized by boiling or autoclaving. (1 reference)

G. S. Tyner.

Gross, Gerhard. **The treatment of herpetic keratitis with dihydroergotamin.** *Klin. Monatsbl. f. Augenh.* 121:15-24, 1952.

The author assumes that the herpes virus is not a formed organ, but an enzyme-like, endogenous product of cell metabolism. This product is under the influence of the corneal innervation and the herpetic infection is under the influence of the autonomic nervous system. Sympatholytic drugs have therefore been used in the treatment of this disease. The author used dihydroergotamin and found the drug successful in 13 early cases of corneal herpes. The drug was also tested in animal experiments and proved to be completely ineffective. (1 table, 48 references)

Frederick C. Blodi.

Hallerman, W. **The topical administration of acetylcholine.** *Klin. Monatsbl. f. Augenh.* 121:397-408.

We know that the corneal epithelium contains more acetylcholine than any other tissue. It is supposed to have a protective function for the epithelium. It has been used in an aqueous solution for topical administration to the eye. The solution is, however, extremely unstable and it must be instilled every two to three minutes because of its quick destruction by cholinesterase. The author tried more stable acetylcholine compounds with honey or cetylic ointment as bases. He had good results in five cases of lime or acid burns. The results were equivocal in

herpes of the cornea and in dystrophies. (3 figures, 1 table, 26 references)

Frederick C. Blodi.

Kall, Erik. **Some further blood observations in patients with "a conjunctivitis of possible protozoal origin occurring in Denmark."** *Acta ophth.* 30:339-342, 1952.

Reference is made to former publications describing the occurrence of spherical bodies in the blood vessels in sections from the conjunctiva, and in the blood of patients with trachomatous conjunctivitis and that of protozoal origin. This investigation reports blood studies of three patients with conjunctivitis following acute respiratory infections. Photomicrographs of the blood smears stained with Giemsa stain show spherical bodies of various sizes and in various morphological formations, free and on the erythrocytes. Since the smallest stages of development are seen on the erythrocytes, the author believes that they should be grouped with the haemosporidia. (14 photomicrographs)

Ray K. Daily.

Kazdan, Louis. **Repair of a corneal fistula with ocular muscle tendon.** *Canad. M. A. J.* 67:472, Nov., 1952.

A ruptured descemetocoele was repaired by suturing a transplant of external rectus tendon to the site of the rupture and covering the entire wound with a purse string conjunctival flap, resulting in 20/50 pin hole vision.

Irwin E. Gaynon.

Kiessling, Werner. **Porokeratosis Mi-belli with corneal participation.** *Dermat. Wehnschr.* 49:1168-1170, 1952.

This rare skin lesion was noted near the external canthus in a child in her first year of life. Now in her eleventh year a barely visible garland of faint gray opacities of the corneal epithelium was noted. Whether the lesion is an extension of the dermal disease to the cornea or a reaction to years of therapy with carbon dioxide

snow and radiant energy is not clear. (1 figure, 3 references)

F. H. Haessler.

Kwaskowski, Adam. **Corneal transplants in the eye clinic in Lodz.** *Klinika Oczna* 22:127-136, 1952.

There were 17 corneal transplant operations in the Eye Clinic in Lodz from 1948 to 1951. They were performed on corneas with leucoma and in one with corneal fistula. Filatow's technique, slightly modified, was used. The donor material was obtained from cadavers and preserved according to Filatow's method. The author discusses each step of the operation and the results of his own experience. In most of the cases there were extensive scars of the cornea and the prognosis was poor. However, in ten there was slight improvement in vision, in five cases there was none and in two the vision became worse. (9 references)

Sylvan Brandon.

Lister, A. **Malignant pigmented tumors in the neighborhood of the limbus treated by radical excision followed by corneo-scleral graft.** *Tr. Ophth. Soc. U. Kingdom* 71:97-107, 1951.

Three patients are described in whom slightly raised pigmented malignant tumors near the limbus were removed by excision which was followed by the insertion of a partial or full thickness corneo-scleral graft. After the operation manifestations of postoperative uveitis appeared simultaneously in both eyes of one patient and suggested a sensitivity or allergic reaction which, one must assume, was a form of sympathetic ophthalmia. One of the tumors was a true melanoma of the cornea.

Beulah Cushman.

Madroszkiewicz, Marian. **Treatment of herpes of the cornea with aureomycin.** *Klinika Oczna* 22:243-245, 1945.

The author describes a case of herpetic keratitis in a 14-year-old boy who was given aureomycin orally and locally.

Within six days the keratitis was completely healed, leaving a faint scar in the cornea.

Sylvan Brandon.

Mitsui, Y., and Yamashita, K. **Change in epithelial structure of conjunctiva with age and its relation to symptoms of conjunctivitis. Preliminary report.** Acta. Soc. Ophth. Japan 56:661, July, 1952, and Yamashita, K. **Final report.** 56:1361-1368, Dec., 1952.

Normal tissue was taken from the fornix conjunctivae of 31 individuals of various ages including the fetus, and the histology was studied for epithelial structure. In fetuses and in infants less than two months of age, the fornix conjunctiva is covered with pavement epithelium of two layers. In adults it became a cylindric epithelium of five to seven layers. In aged people, it is apt to be flat again and to have fewer layers. In the lower fornix, the epithelium becomes cylindric and more stratified at an earlier age than in the upper fornix. The authors consider trachoma virus to have a "cylindric epithelium tropism." In infants, where the epithelium is flat, the clinical signs and course of trachoma are thus peculiar. An early development of cylindric epithelium in the lower fornix explains the more severe appearance of infantile trachoma in the lower than in the upper fornix in contrast to the converse in adults. The authors further consider Koch-Weeks' bacilli to have a "pavement epithelium tropism" and discuss the difference in clinical appearance of the infection in infants and in adults. Yukihiro Mitsui.

Mitsui, Yukihiro. **Acute trachoma.** Rev. intern. du trachome 29:321-331, 1952.

The acute stage of trachoma is frequently overlooked. In adults, the incubation period is about one week. At onset the clinical picture resembles epidemic keratoconjunctivitis, or acute catarrhal or follicular conjunctivitis. Preauricular ade-

nopathy and swelling of the semilunar fold are frequently present. Follicle formation, affecting particularly the upper fornix, is characteristic. Inclusion bodies are readily obtainable. Monocytes and lymphocytes constitute 10 to 50 percent of the cells in the discharge. In one to two months the acute signs subside and the chronic stage of localization in the upper fornix sets in. The follicular reaction is minimal in infants less than a few months old, and the acute stage is of only one to three weeks' duration. Without the examination for inclusion bodies the acute stage of trachoma cannot be definitely diagnosed. (15 references)

James E. Lebensohn.

Neame, Humphrey. **Oedema of the cornea.** Tr. Ophth. Soc. U. Kingdom 71: 381-389, 1951.

The author emphasizes the difference between edema of the corneal epithelium and the edema of the substantia propria. To be able to differentiate between the two conditions is of great value in its clinical application and the terms should not be confused. Edema of the epithelium is found in inflammatory conditions such as disciform keratitis and after cocaine drops. It has also been named "corneal bedewing." It should not be confused with endothelial edema, which can be determined in stereoscopic vision by careful focusing on the endothelium and which is usually associated with a deposit of fine particles on the endothelium. Edema of the substantia propria is found in iritis and uveitis with subnormal tension, and the striate keratitis found after surgery.

Beulah Cushman.

Páez-Allende, Francisco S. **Two cases of anterior gigantophthalmia (megalo-cornea.)** Arch. oftal. Buenos Aires 26: 17-29, Jan. 1952.

A brief historical review of this condition is first outlined. The author then de-

scribes two brothers, 8 and 9 years of age, who, aside from the eye condition, are in all respects perfectly normal, confirming the statement that megalocornea is a malformation of "healthy eyes in a healthy body." The eye condition was congenital and identical in the two brothers, who had normal visual acuity, normal fields and normal tension. This condition is quite different from acquired megalocornea and buphthalmos. It may best be called anterior gigantomphalopia.

Joseph I. Pascal.

Páez-Allende, F. **Essential megalocornea.** Arch. y Mem. Soc. oftal. del Litoral 4:122-134, 1951.

After reviewing the history of the condition, the author presents the case of two brothers, nine and eight years old, whose corneas had a diameter of 17 mm. and were markedly prominent and perfectly transparent; the visual acuity and the ocular tension were normal. Differential diagnosis from hydrophthalmos rests mainly in the last mentioned features and in the congenital and nonprogressive character of the condition. (3 figures, 60 references)

A. Urrets-Zavalía, Jr.

Pasino, Luigi. **Pathogenic consideration of a case of allergic nodular conjunctivitis.** Rassegna ital. d'ottal. 21:371-380, Sept.-Oct., 1952.

The patient described was a boy 9 years of age. At the end of his first year asthma developed, followed after an interval by digest upsets, especially to fatty foods. Later congestion and nodules of the conjunctiva of the right eye appeared. Studies revealed that liver function was abnormal, and change of diet and eye drops cleared that condition. The illness is explained as being due to an alteration of the proteolytic function of the liver and consequent absorption of abnormal substances by the intestinal mucosa, aided by alterations of neurogenic tone. Thus the conjunctiva be-

came sensitized. (3 figures, 30 references)
Eugene M. Blake.

Pavišič, Z. **The corneal astigmatism in cases of pterygium.** Ophthalmologica 124: 157-165, Sept., 1952.

Measurements of the corneal curvature were made with the keratometer of Javal-Schiøtz in 64 cases of pterygium before and after surgery. In 70 percent of these cases the removal of the pterygium was followed by a definite increase in curvature of the horizontal corneal meridian which probably meant that the presence of the pterygium had caused a flattening of the horizontal meridian. The vertical meridian was not significantly affected. (10 references)

Peter C. Kronfeld.

Pinto, Silva. **Perforating keratoplasty: some experimental facts.** Arq. portug. de oftal. 4:29-50, 1952.

One of the most important factors in the success of the surgery is the cutting of Descemet's membrane. Failure to do this in an accurate and regular manner may lead to in-growth of the membrane and eventual opacification of the graft. The presence of edges of the membrane between the graft and the recipient tissue delays the fixation of the transplant. The well-known resistance of Descemet's membrane allows it to remain in the wound for quite some time. The presence of glutathione and cysteine indicate that the membrane is keratinoid, and therefore resistant to pressure and traction.

A retrograde degeneration of the corneal nerves occurs at the time of surgery. Regeneration begins after surgery and within three weeks the filaments reach the junction of the recipient and graft. Within four to six weeks, nerve fibers have invaded the transplant. The rate of growth is much more rapid in opaque grafts, which regain sensitivity earlier than transparent ones. Vascularity expedites the rate of re-innervation. Histologic

studies indicate that cellular elements in the graft are essentially those of the recipient, migrating across the wound edge to the new tissue.

Vascularity of the transplant predisposes to opacification, but is not always the cause. Often the cause is obscure. Corneal metabolism depends upon three sources of nutrition: the limbal vessels, the aqueous, and to a less degree, the lacrimal secretion. This has been verified through the use of radio-active isotopes. All investigations seem to indicate that the corneal nutrition follows a centripetal course, irrespective of source, therefore, anything that puts a greater load upon the normal channels of nutrition can evoke corneal vascularity. (6 figures, 2 tables, 23 reference)

James W. Brennan.

Report of Committee on Trachoma of U.N. World Health Organization. Rev. intern. du trachome 29:275-313, 1952.

In this extensive report, the committee, which includes Thygeson of the U.S.A., recommends for mass treatment of trachoma the continued local use of aureomycin or terramycin ointment four times daily for two months. In resistant cases this is combined with the systemic administration of sulfonamides, 1/3 gr. per pound per day, in divided doses, for three weeks. In the absence of cure, the sulfonamide treatment is repeated once or twice with an interval of 10 days between courses. Gentle expression of soft follicles is occasionally permissible, as also the painting of the palpebral conjunctiva with silver nitrate. Among the numerous research projects endorsed is a more rapid method for the detection of inclusion bodies.

James E. Lebensohn.

Scuderi, G. **Aureomycin, chloramphenicol, and terramycin in corneal herpes.** Gior. ital. oftal. 5:119-136, March-April, 1952.

These antibiotics exerted a beneficial effect on the course of human corneal herpes simplex in an unpredictable and irregular manner. Cases favorably influenced showed subjective improvement after 24 to 48 hours and objective improvement after 48 to 72 hours. Earlier cases seemed to do better and combined local and systemic administration of these drugs worked better than local treatment alone. No change in the course of experimental corneal herpes or herpes encephalitis of rabbits or mice was observed when these agents were used. (5 figures, 52 references)

J. J. Lo-Presti.

Shreck, H. W., and Carriker, F. R. **Pterygium problems in the Canal Zone.** A.M.A. Arch. Ophth. 48:716-719, Dec., 1952.

At Gorgas Hospital 170 patients were operated on for pterygia during 1950 and 1951. The authors believe that the cause is chronic conjunctival inflammation. Dietary deficiencies may be a factor. Two types of pterygia are recognized 1. the small, slow growing, avascular type and 2. the highly vascular, thick inflamed type. Type 1. may be left alone or treated surgically by simple excision or transplantation. Type 2. requires early operation and is best treated by one of the "bare-sclera" techniques. The corneal head of the pterygium and episcleral tissue must be thoroughly excised. The procedure should be preceded by the use of antibiotics and followed postoperatively with topical cortisone. Soft X-ray radiation is beneficial in suppressing granulation tissue and vascularization of the cornea. (12 references)

G. S. Tyner.

Sobanski, Janusz. **Treatment of scrofulous inflammation of the conjunctiva and the cornea.** Klinika Oczna 22:141-146, 1952.

Examination of 177 patients with scrofulous inflammation of the eye led

the author to believe that four factors must be present to produce changes of a scrofulous type, namely: 1. exudative diathesis, 2. allergy to tuberculosis bacilli, 3. decreased resistance of the patient and 4. superimposed local inflammation due to infection or trauma. He uses local treatment to alleviate discomfort, 5-percent sulfathiazole for secondary infection, atropine when necessary, and general supportive treatment. (4 references)

Sylvan Brandon.

Stanković, M. **A case of double Kayser-Fleischer ring.** *Ophthalmologica* 124:100-104, Aug., 1952.

A 40-year-old man with neurologic findings suggestive of Wilson's disease (progressive lenticular degeneration) showed a very pronounced Kayser-Fleischer ring which, macroscopically, consisted of two distinct zones and thereby appeared double. In the area of a pterygium that was present in one eye, the pigment ring deviated toward the center of the cornea, remaining, thereby, "ahead" of the pterygium, but a typical limbus-parallel portion of the ring became visible after surgical removal of the pterygium. (2 figures, 12 references)

Peter C. Kronfeld.

Strazzi, A. **Familial band-shape degeneration of the cornea.** *Gior. ital. ofal.* 5: 89-99, March-April, 1952.

Bilateral band-shaped keratitis was observed in a 19-year-old man whose only symptoms were gradual diminution of vision. His older sister showed a similar but more severe disturbance. Keratoplasty resulted in restoration of vision to 20/30. Because of the favorable response to this type of surgery, it was decided to classify the case as a familial dystrophy probably related more closely to the third group (crumb-like or speckled) of Bückler's classification. The histopathology and a discussion of possible etiological

factors are presented. (4 figures, 34 references)

J. J. Lo-Presti.

Szillinsky, R. **Closure of a corneal defect by coagulation.** *Klin. Monatsbl. f. Augenh.* 121:78-79, 1952.

The author closed a defect in the cornea by coagulating the inflamed margins by diathermy. The closure succeeded and he suggests that a similar procedure could be used for corneal transplants.

Frederick C. Blodi.

Theodore, F. H. **Drug sensitivities and irritations of the conjunctiva.** *J.A.M.A.* 151:25-30, Jan. 3, 1953.

In drug irritations the use of the same drug may be continued if it is prepared in a manner that prevents irritation, whereas in allergies an entirely different drug must be substituted. Drug sensitivity is characterized by itching, dermatitis, conjunctivitis, and conjunctival eosinophilia or basophilia. Sensitizers include local anesthetics, sulfonamides, mydriatic alkaloids and mercurials. Drug irritants act directly on the conjunctiva. The clinical picture is that of a watery conjunctivitis without dermatitis or eosinophilia, and if irritation persists, a follicular conjunctivitis. Drugs should be prepared in vehicles having a proper pH, using a boric acid-potassium chloride buffer. (12 references)

Irwin E. Gaynon.

Tosi, Bruno. **The white rings of Coats.** *Arch. ofal.* Buenos Aires 27:222-228, May, 1952.

This curious, biomicroscopic picture was first presented by George Coats in 1912. The white ring of Coats appears as a little white, round or oval, formation about 1 mm. in diameter. Inside the rings are usually some minute chalk-white spots. The slitlamp shows that these opacities generally lie at the level of Bowman's membrane, sometimes behind it,

and more rarely in front of it in the deeper layers of the corneal epithelium. Coats believed the rings to be congenital. Seven such cases are presented. (7 figures)

Joseph I. Pascal.

de Vincentiis, Mario. **Bilateral symmetrical dystrophy of Bowman's membrane.** A.M.A. Arch. Ophth. 48:636-638, Nov., 1952.

A case of bilateral symmetrical dystrophy of Bowman's membrane is reported. No similar case report has appeared in the literature. (4 figures, 14 references)

George S. Tyner.

Vrabec, F. **Histologic study of psoriasis of the conjunctiva and cornea.** Ophthalmologica 124:105-108, Aug., 1952.

One conjunctival and one corneal psoriatic lesion from the left eye of a 36-year-old man were studied biomicroscopically and histologically. The characteristics of psoriatic lesions as established by earlier authors were confirmed. Slight differences encountered between cutaneous and ocular lesions could be accounted for by differences in tissue texture. (2 figures, 4 references)

Peter C. Kronfeld.

Wilson, F. M., and Wilson J. W. **Radioactive strontium therapy of the eye.** A.M.A. Arch. Ophth. 48:686-695, Dec., 1952.

A new beta irradiation applicator is illustrated, the RA-1 applicator, which is of two types and utilizes radioactive strontium (Sr^{90}) as a source of beta ray emission. The paper presents data concerning the effects of this applicator on rabbit and human eyes. The average clinical dose was about 16,000 rep delivered in a single exposure. Radioactive strontium is considered a desirable material for use in ophthalmology, but the applicators are unsatisfactory. (2 figures, 5 tables, 14 references)

G. S. Tyner.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Auvert, B., and Lavat, J. **Heterochromia of Fuchs and puncture of the anterior chamber.** Ann. d'ocul. 185:810-813, Sept., 1952.

A man, aged 49 years, noticed gradually failing sight in his right and only eye, the left having been enucleated 15 years previously because of a lime burn. Vision was 0.1 with a stenopaic slit. The objective findings included corneal precipitates, aqueous turbidity, iris atrophy, subcapsular lens opacities and vitreous opacities. An Amsler puncture revealed six lymphocytes per cu. mm. The following day a hemorrhage was observed at the opposite side from the puncture, suggesting vascular fragility and Fuchs's heterochromia. This was substantiated by the patient's statement that since infancy the affected eye was much lighter in color. A cataract extraction without iridectomy was successfully performed. (4 references)

Chas. A. Bahn.

Hager, H. **The treatment of eye diseases with irgapyrin.** Ophthalmologica 124:205-220, Oct., 1952.

Irgapyrin is a mixture of aminopyrine and butazolidine, the latter a pyrazoline derivative related to antipyrine. The drug is available in 30 percent solution for intramuscular injection and in suppositories. The action is analgesic, antipyretic, and antiphlogistic. Irgapyrin is principally used in the treatment of acute or subacute rheumatic arthritis and as a nonnarcotic analgesic.

The present report comes from the University Eye Clinic of Tübingen, Germany, where irgapyrin has been very extensively used in the treatment of acute or subacute inflammatory eye diseases. Acute "rheumatic" iritis was found to respond very promptly and favorably to daily intra-

muscular injections of irgapyrine. Many other forms of acute or subacute iritis responded almost equally well. Postoperative iridocyclitis and post- and metaherpetic inflammations were favorably influenced. On the whole, the results of irgapyrin therapy seem comparable to those of topical or systemic cortisone administration. (3 figures, 1 table, 35 references)

Peter C. Kronfeld.

Hobbs, H. E. **Cortisone in anterior uveitis.** Tr. Ophth. Soc. U. Kingdom 71: 475-485, 1951.

Cortisone was most beneficial in the active exudative stage of uveitis which supports the hypothesis of Woods as to its action.

Beulah Cushman.

Niedermeier, Siegfried. **The consensual vascular reaction in the eye.** Klin. Monatsbl. f. Augenh. 121:313-318, 1952.

In animal experiments on choroidal detachment the author noticed trophic disturbances around the other eye three weeks after the original methylene-blue injection. He speculates on the importance of these consensual reactions in the etiology of sympathetic ophthalmia. (2 figures, 4 references)

Frederick C. Blodi.

deVeer, J. Arnold. **Sympathizing eye in sympathetic ophthalmia.** A.M.A. Arch. Ophth. 48:723-737, Dec., 1952.

The author presents a clinical and pathological report with 10 photomicrographs of a "sympathizing" eye which was enucleated 15 weeks after an extracapsular cataract extraction from the "exciting" eye. The observations, in the author's opinion, substantiate the existing opinion that the specific lesion of sympathetic ophthalmia is the same in the exciting eye as in the sympathizing eye. Of special interest were areas of coagulation necrosis

found after bleaching the specimen. (10 figures, 8 references)

G. S. Tyner.

Vrabec, F. **A special mode of precipitate formation in chronic uveitis.** Ophthalmologica 124:26-34, July, 1952.

The author has made a systematic study of a special type of corneal precipitates which he has found in several varieties of uveitis. It is characteristically spindle-shaped with tiny pointed prolongations springing from the two extremities of the individual deposit. Its shape, as seen with the high power of the slitlamp, resembles so closely the appearance of fibroblasts in tissue culture that there can be no doubt as to its fibroblastic nature. This type of precipitate occurs in the common form of chronic iridocyclitis, in hypertensive uveitis, in cyclitis associated with heterochromia and complicated cataract, in posttraumatic as well as in sympathetic iridocyclitis. The occurrence of these deposits on the posterior surface of the cornea is in many respects analogous to the survival, in a tissue culture of white blood cells, of monocytes which under favorable conditions develop into fibroblasts. These favorable conditions are provided in the eye by a high protein content of the aqueous. The spindle-shaped deposits probably indicate a special form of differentiation of exudative cells. (12 references)

Peter C. Kronfeld.

9

GLAUCOMA AND OCULAR TENSION
van Beunnigen, E. G. A. **Two years' experience with Doryl-Z.** Klin. Monatsbl. f. Augenh. 121:345-348, 1952.

The author reports his experiences with a new doryl-emulsifier combination. He used it on 68 patients with chronic glaucoma, usually three times a day. The pressure could be controlled even if 2-percent pilocarpin solution had been unsuccessful before.

Frederick C. Blodi.

Graue, Enrique. **Traumatic glaucoma.** *An. Soc. mex. de oftal.* 24:120-136, April-June, 1950.

Traumatic glaucoma may follow injury to the globe either by accident or by surgical procedures. The increase in tension may develop immediately following the trauma or it may be delayed. When it develops immediately it may be due to a preexisting benign tension, an intraocular hemorrhage or a luxation of the lens. Postoperatively it may occur after an iridectomy, cataract extraction or a filtration operation. In cataract extraction it is more apt to occur after an extracapsular extraction or needling. In contusions of the globe the rise in intraocular tension may vary from a mild tension to an intractable glaucoma. In mild contusions of the globe there may be an initial rise in tension of short duration followed by a longer period of hypotony, but in more severe trauma the tension may be high for a longer time. Experimentally an increase in the albumen content of the aqueous has been found which indicates a disturbance of the blood-aqueous barrier. Fluorescein injected intravenously will appear sooner in the injured eye. A contusion of the globe causes a vascular instability with dilatation of the capillaries, stasis, and edema which is comparable to the condition found in congestive glaucoma.

Jose Pietri.

Lloyd, J. P. Francis. **An experiment in the study of behavior pattern in the clinical study of groups of glaucoma cases.** *Tr. Ophth. Soc. U. Kingdom* 71:459-474, 1951.

The author presents a detailed semi-statistical survey of a large group of patients which might refute certain points taught about glaucoma. He felt that it might aid in a better classification and in the elucidation of the etiological problems. A large number of congestive glaucomas must be regarded as a terminal phase occurring in chronic glaucoma with

continuously high tension. The less common type showing only a brief paroxysmally acute tension ratio associated with congested features is a different clinical entity. The true acute form can occur only in the presence of a narrow chamber angle, while chronic glaucoma can occur with any chamber angle.

In charts made in color, patterns emerged which tended to confirm the belief that there are two separate forms of congestive glaucoma, and their treatment differs as does the underlying cause. In the low tension group the anatomical factor is coincident with ill affects of a vascular factor. (9 figures, 6 tables)

Beulah Cushman.

Miller, S. J. H. **Symptomatology of primary glaucoma in the adult.** *Arq. portug. de oftal.* 4:15-27, 1952.

Records of 180 patients at the Glaucoma Clinic, Institute of Ophthalmology in London have been reviewed by the author. He found that congestive glaucoma may have an acute onset in an eye which apparently was healthy before the attack. Prodromal symptoms of haloes, pain, and blurred vision are often ignored by both patient and physician, although their occurrence may precede an acute attack in a high percentage of patients. There are periodic elevations of ocular tension, precipitated by emotional strain and fatigue. Sleep has a beneficial effect on the tension; a mid-day nap affords relief of pain or blurred vision. Cupping of the optic nerve head and loss of portions of the visual field are not found typically in early stages of the disease, and usually develop at the same rate in later phases. In general, patients with congestive glaucoma are anxious and nervous individuals.

Simple glaucoma has an insidious onset and may have no ocular symptoms in its early stage. Blurred vision in one eye is the most common presenting symptom found at the clinic. Many patients have

reduced accommodative power, and complain of inability to do close work. Diurnal variations in ocular tension are rather constant. Cupping of the papilla and field changes occur early. (10 tables, 4 references)

James W. Brennan.

Nikosiewicz, Michal. **Ocular tension during and after treatment with sleep.** *Klinika Oczna* 22:181-194, 1952.

The author investigated the behavior of the intraocular tension in the patients receiving the sleep treatment. The physiology of the ocular tension is discussed. The theory of the treatment with sleep is described and the technique of this treatment, as used in the clinic of internal medicine in the University of Wroclaw, is given. The measurements during sleep were limited because waking the patients for the measurement disturbed the treatment. Forty-five patients treated with sleep were examined, 25 of them had peptic ulcer, 15 hypertension, 4 nervous disorders and 1 glaucoma. Eyeground examination revealed changes only in the patients with hypertension. These changes were affected only to a slight degree by the sleep. When reduction of tension was achieved, the tension remained low for two weeks and then returned to the previous level. The induced sleep seems to have beneficial influence on the intraocular changes and the ocular tension is kept consistently, though slightly, lower. Nystagmus, diplopia and decrease of accommodation which were seen in some patients were attributed to the drugs used to induce the sleep. (54 references)

Sylvan Brandon.

Scheie, H. G. **Glaucoma.** *A.M.A. Arch. Ophth.* 48:752-782, Dec., 1952.

The literature on the subject for 1951 and 1952 is reviewed under three broad headings of primary, secondary, and congenital glaucoma. The papers on primary glaucoma are further subdivided into

those on 1. mechanical and neurovascular process, 2. diagnosis, and 3. medical and surgical treatment. Congenital glaucoma may be infantile or juvenile. The contributions on secondary glaucoma are grouped on the basis of the primary cause. (163 references)

G. S. Tyner.

Sondermann, R. **The development of the normal intraocular pressure.** *Ophthalmologica* 124:141-156, Sept., 1952.

This is a posthumous restatement of Sondermann's well known theory according to which the intraocular pressure builds up to its normal level as the result of a gradually increasing resistance to the outflow of blood through the vortex veins. This resistance is due to a gradual process of densification of the sclera around the veins. Sondermann's main argument still is the high (58 to 62 mm. Hg) venous pressure readings which he obtained by direct cannulation of vortex veins in the rabbit, measurements which no other investigator has been able to confirm or even approach. (14 references)

Peter C. Kronfeld.

Weekers, L., and Weekers, R. **The treatment of ocular hypertension with retrociliary diathermy.** *Ophthalmologica* 124:221-227, Oct., 1952.

In response to many inquiries from ophthalmologists desirous to take up the retrociliary diathermy operation the authors have condensed their extensive experience into a few practical rules. The diathermy must be applied behind the ciliary body at a distance of approximately 7 mm. from the limbus. More anterior applications share with most other antiglaucomatous operations the danger of lens damage. The diathermy applications are aimed at the supraciliary and suprachoroidal nerve plexuses. It seems to be of importance that the applications are evenly spread over the entire circumference of the anterior uvea. The authors

recommend 24 applications distributed evenly over the four quadrants. The electrode is flat, measures only 0.75 mm. in diameter and is coupled with a thermometer that measures the temperature reached at the immediate site of application. In the standard procedure a temperature of 90° centigrade and a duration of each application of 15 seconds are used. In case of a favorable but insufficient response to a retrociliary diathermy the operation can safely be repeated either with the standard technique at new sites 1 mm. closer to the limbus or with less current (temperatures not exceeding 85° centigrade) at the original sites. (35 references)

Peter C. Kronfeld.

Weekers, R., and Prijot, E. **Measurements of the resistance to aqueous outflow. Part V. The mode of action of the iridencleisis in chronic noninflammatory glaucoma.** *Ophthalmologica* 124:166-172, Sept., 1952.

Tonographic determinations of the resistance to aqueous outflow (the reciprocal of Grant's coefficient of the facility of outflow) were made in 24 cases of chronic noncongestive glaucoma about three months after successful, that is tension-normalizing, iridencleises. The results in the operated eyes are compared with a control group and a group of unoperated glaucomatous eyes.

The authors stress the fact that in the majority of their successful iridencleises the resistance to aqueous outflow was brought down to the normal range and that the area of the operation did not show any signs of filtration of aqueous into subconjunctival tissue spaces. These findings suggest that the action of the iridencleisis consists in enhancing or re-establishing the function of the normal outflow channels.

Only in about one fourth of their cases did a permanent bleb form; in these cases the resistance to aqueous outflow tended

to be lower than in normal eyes. Those cases were clearly fistulating.

Whether an iridencleisis has produced a filtering bleb or not, there is the possibility of temporary reduction in the rate of aqueous secretion as a direct or indirect effect of the operation. (2 tables, 6 references)

Peter C. Kronfeld.

Werner, L. E., and Macdougald, T. J. **Low-tension glaucoma—its diagnosis and treatment.** *Tr. Ophth. Soc. U. Kingdom* 71:439-458, 1951.

The authors present a number of patients with glaucoma with field defects who had variable intraocular tension but in whom the visual loss deteriorated gradually in spite of general and local treatment. The most important factor in the medical treatment is the early diagnosis aided by visual fields, repeated tonometries, lability tests and other examinations as indicated.

In the low-tension group the control with miotics was fairly high and indications for operations depended on the loss in the visual field. A single operation took care of 40 percent and the success rate was high. Lens changes and macular failure were as frequent as in the high pressure group. (14 figures, 7 references)

Beulah Cushman.

10

CRYSTALLINE LENS

Bentolilla, L., Vila-Ortiz, J. M., and Bertotto, E. V. **Allergic cataract.** *Arch. y Mem. Soc. Oftal. del Litoral* 4:83-87, 1951.

According to Franceschetti, cataract syndematotica may be divided into two main types: in one of them—the so-called allergic cataract—crystalline opacities appear in close association with diverse forms of neurodermatitis, such as atopic eczema, and with pemphigus foliaceus; in the other, changes of the lens are related

to such skin conditions as poikiloderma (Rothmund's syndrome) and scleroderma (Werner's syndrome).

The case of a twenty-one year old patient is reported, in which a bilateral, uniformly dense cataract appeared in connection with a severe atopic eczema of early onset and chronic evolution. (1 figure, 22 references)

A. Urrets-Zavalía, Jr.

Bottoni, A. **Myotonic dystrophy of Steinert and cataract.** *Gior. ital. oftal.* 5: 137-147, March-April, 1952.

After a comprehensive description of the general bodily and lenticular changes, two cases, in a brother and sister, are reported in detail. This heredofamilial disease has both dominant and recessive characteristics which may appear only in part or in their entirety in the same or different generations. The lens changes in the cases presented are of the Vogt type, consisting of a few colored and mostly white dots chiefly in the periphery of the cortex. (26 references) J. J. Lo-Presti.

King, E. F. **A technique of intracapsular extraction of the lens using a keratome.** *Tr. Ophth. Soc. U. Kingdom* 71:77-90.

The author advises the use of barbiturates a few days before the operation. He blocks the facial nerve and gives a retrobulbar injection for anesthesia. The lid is retracted with a speculum until the corneal section is made; then a lid retractor is used. Conjunctivo-scleral sutures are inserted and the corneal section, made with a keratome, is enlarged with a scissors on one side only. The cross-action capsule forceps is used to grasp the anterior capsule and partially tumble the lens. Peripheral iridectomy is carried out preferably, but if the iris shows a tendency to prolapse, a complete iridectomy is done. The conjunctival flap is closed

and a bubble of sterile air is injected into the anterior chamber. Eserine, pilocarpine and penicillin are instilled and the upper lid drawn over the eye by means of a suture and fixed to the cheek. (8 figures)

Beulah Cushman.

Kozłowski, Bogumil. **Methods of extraction of dislocated and partially dislocated lenses.** *Klinika Oczna* 22:219-224, 1952.

The author describes his method of extraction of displaced lenses. After placing a suture on the upper rectus muscle and preparing a conjunctival flap, incision ab externo is made. It is enlarged with scissors, if necessary. Iridectomy is done, if there is any bulging out of the iris. The lens is removed with a loop. This method was successfully used in 28 cases. In 11 of them the lens was in the anterior chamber, in 11 it was partially dislocated and in 6 cases the lens was in the vitreous. No serious complications were encountered. (5 references) Sylvan Brandon.

Litricin, Olga. **Contribution to the etiological study and pathogenesis of anterior lenticonus.** *Ann. d'ocul.* 185:960-965, Nov., 1952.

This interesting dystrophy is primarily due to a potential constitutional weakness of the anterior lens capsule which usually becomes manifest in early childhood. The increasing volume of the lens combined with lack of counter pressure in the pupillary opening result in a symmetrical bilateral protrusion of the lens capsule which is slightly larger than the pupil. In the case reported the patient was a 19-year-old girl with a .2 corrected vision in each eye. Both eyes were normal except for the symmetrical anterior lenticonus which protruded 2 mm. and was 3 mm. in diameter. An associated deafness was attributed to meningitis in childhood. (17 references) Chas. A. Bahn.

Ridley, Harold. **Intraocular acrylic lenses.** Tr. Ophth. Soc. U. Kingdom 71: 617-621, 1951.

A lens made by Rayners, London, from transparent unpolymerized polymethyl methacrylate measuring 8.3 mm. in diameter and 2.4 mm. in thickness with refractive index 1.49 and specific gravity of 1.19 was inserted into the eye immediately after an extracapsular lens extraction. No severe complications were experienced in eight cases. Beulah Cushman.

11

RETINA AND VITREOUS

Alajmo, Arnaldo. **Retinal detachment in aphakia.** Gior. ital. oftal. 5:100-118, March-April, 1952.

After a review of the pathogenesis of retinal detachment, 19 cases in aphakia are reported, representing 2.5 percent of the 768 detachments observed over a period of 10 years at the Naples Clinic and 0.14 percent of all the cataract extractions. Nine of the patients were myopic; of seven patients operated on five obtained clinical cure; holes were found in eight cases, usually at the equator; six cases were bilateral. Detachment in aphakic eyes is not in any sense different from other retinal detachment either in its development or response to treatment. However, the duration of detachment is usually longer, the tendency toward replacement with bed rest is less, breaks are more often in the extreme periphery and tend to be multiple, and degenerative changes in the retina, vitreous and choroid are more frequent. (1 table, 20 references)

J. J. Lo-Presti.

Bembridge, B. A. **Retrolental fibroplasia.** Tr. Ophth. Soc. U. Kingdom 71: 605-608, 1951.

Since 1948, 21 cases of retrolental fibroplasia were seen at Oxford. Nine of these eyes were examined histologically; they

had been enucleated because retinoblastoma was feared. The author believes that the condition may be congenital or acquired and that the eye changes may be a manifestation of a generalized angioplastic process. (1 figure, 2 references)

Beulah Cushman.

Coxon, M. W. **Retrolental fibroplasia.** Tr. Ophth. Soc. U. Kingdom 71:591-598, 1951.

Twenty-one cases of retrolental fibroplasia occurred in babies treated in the Maternity Department of the Radcliffe Infirmary and Churchill Hospital. (5 figures, 5 tables, 3 references)

Beulah Cushman.

Cross, A. G. **The modern treatment of retinal detachment.** Tr. Ophth. Soc. U. Kingdom 71:645-647, 1951.

The author found that the surgical treatment of retinal detachment in civilian life was not as satisfactory as in the armed forces. In the service he obtained satisfactory results in 65 percent of the patients, whereas in civilian life in only 47 percent. He performed scleral resections on patients where some part of the retina remained attached. Since then the retina was replaced in 6 of 21 eyes. Scleral resections bring about reattachment in 10 to 20 percent of eyes in which the established diathermy operation failed. The author uses a general anesthetic and combines full thickness resection and lamellar resection in the same patient. For success in treatment careful search for all retinal holes, application of diathermy about these holes, and release of subretinal fluid is necessary. Scleral resection is indicated where holes cannot be found.

Beulah Cushman.

Cross, V. Mary. **Retrolental fibroplasia in Birmingham.** Tr. Ophth. Soc. U. Kingdom 71:609-612, 1951.

One patient was found in 1946, one in

1948, eight in 1949 and four in 1950 in scattered Birmingham hospitals. The first nine cases were in the two-to-three-pound group; the last four in the three-to-four-pound group and occurred during the spring, summer and autumn. The number of cases of retrolental fibroplasia increased while the actual number of premature births decreased, and the birth weight gradually increased. The survival group of premature babies had shown a steady increase in each weight group. The present survival rate in the two to three pound group was obtained in 1950, and no cases of retrolental fibroplasia were found, while in the three to four pound group two cases developed. (1 figure, 3 tables) Beulah Cushman.

Evans, P. Jameson. **Retrolental fibroplasia.** Tr. Ophth. Soc. U. Kingdom 71:613-616, 1951.

The author suggests that the circumstances of extra-uterine existence rather than intra-uterine life determine the onset of this dysfunction. The supply of oxygen as supplied may be sufficient to protect life but insufficient to prevent capillary budding from the venous channels.

Beulah Cushman.

Everett, W. S. **Nondiabetic lipemia retinalis.** A.M.A. Arch. Ophth. 48:712-715, Dec., 1952.

This is the thirteenth case report in the literature of lipemia retinalis in a nondiabetic. The patient is a 3½-year-old child who was on a high fat diet. The appearance of the retina returned to normal after 24 hours of starvation. (28 references)

G. S. Tyner.

Feist, S., and Prskavec, F. **Placental therapy in retinitis pigmentosa.** Klin. Monatsbl. f. Augenh. 121:329-340, 1952.

Placenta therapy gave good results in five of 15 patients with retinitis pigmentosa and some improvement in five

others. It is assumed that placental extracts have a hormonal and vasodilator effect. (8 figures, 54 references)

Frederick C. Blodi.

Ferrara, Aristide. **Bilateral, simultaneous thrombosis of the central retinal vein.** Rassegna ital. d'ottal. 21:326-337, Sept.-Oct., 1952.

The principal cause of thrombosis is almost always a marked reduction of the circulation, associated with a marked diminution of the blood column in the arteries. The velocity of the current is an important element in the circulation, especially in the latter years of life. The case reported occurred in a married woman of 29 years who for some months had had low grade fever and severe uterine bleeding as a result of endometritis and profound anemia. Red cells were reduced to 900,000, white cells to 7,500. Hemoglobin was 24 percent and capillary fragility tests were negative. Intensive therapy with liver, iron, and vitamins was not effective and transfusions were required. Vision was gradually growing worse. Ophthalmoscopically, marked dilatation and tortuosity of the veins, with numerous hemorrhages, especially near the nerve head were noted. Vision was reduced to 1/60 in the right eye and to 1/30 in the left, and there was a large paracentral scotoma in each. Later exudates appeared on the lens capsule, but finally cleared, disclosing complete occlusion of the central retinal arteries, leading to atrophy of the nerves. The possibility of dental extraction, leading to low grade bacteremia and resultant necrosis of vessels was suggested as an etiologic factor. (11 references)

Eugene M. Blake.

Fornaro, L. **Action of ACTH and melanophore hormone on experimental pigmentary degeneration of the rabbit.** Gior. ital. oftal. 5:148-156, March-April, 1952.

Pigmentary retinal degeneration in the

rabbit induced by intravenous sodium iodate is prevented to a great extent by the administration of melanophore hormone and to a lesser extent by ACTH. The resemblance of this experimental condition to human retinitis pigmentosa is noted and the possible mode of action of tissue therapy of Filatow, pituitary extracts, and melanophore hormone is discussed. (3 figures, 22 references)

J. J. Lo-Presti.

François, J., and Verriest, G. **Unilateral pigmentary retinopathy.** *Ophthalmologica* 124:65-88, Aug., 1952.

A case of unilateral retinitis pigmentosa, observed for more than 20 years and with negative family history, is reported in detail, together with a thorough review of 56 similar cases recorded in the literature. The authors conclude that the classical picture of retinitis pigmentosa does occur unilaterally. The unilateral forms start relatively late in life and without any demonstrable genetic mechanism. The authors consider the unilateral forms manifestations of a local or systemic disease distinctly different from the idiopathic degeneration which is the basis of the bilateral forms. (8 figures, 1 table, 54 references)

Peter C. Kronfeld.

Friedenwald, Jonas S. **Diabetic retinopathy.** *J.A.M.A.* 150:969-971, Nov. 8, 1952.

Friedenwald briefly reviews descriptions and nature of the capillary aneurysms found in diabetes. He then describes the relation between the lesions in the retina and those in the kidney. The main difference is that his retinal studies show the hyaline deposit to be laid down inside the basement membrane, whereas Kimmelstiel's studies showed that in the kidney the hyaline is laid down outside the basement membrane. He notes that these lesions have not been described in other organs; and that an abnormal muco-

protein in the plasma is not the cause of the lesions. He states that similar lesions can be caused by cortisone administration and suggests that the lesion is the result of some synergism between the diabetic state and adrenal cortical hormones. (16 references)

Harry Horwich.

Houlton, A. C. L. **A study of cases of retrolental fibroplasia seen in Oxford.** *Tr. Ophth. Soc. U. Kingdom* 71:583-590, 1951.

The author describes the first patient with retrolental fibroplasia seen at the Oxford Eye Hospital in July, 1948. Before September, 1950, 17 patients were seen. Nine eyes were removed for pathologic examination. No treatment was found to be efficacious. (2 figures)

Beulah Cushman.

Jackson, C. R. S. **Retrolental fibroplasia.** *Tr. Ophth. Soc. U. Kingdom* 71:599-604, 1951.

The author emphasizes the extreme rapidity with which an apparently normal eye may be transformed into one which is without doubt abnormal, as found in eight patients which were diagnosed during the routine examination of the premature babies. The infantile optic disc is extraordinarily pale and the peripheral part of the retina constantly has a peculiar edema-like grayness which gradually merges into the normal color as the optic disc is approached. Full term babies have the same appearance at the periphery of the retina. Three signs which suggest the development of retrolental fibroplasia are retinal detachment, retinal vascular dilatation and vitreous opacity. The eye is usually normal during the first few weeks, then within a few days the retinal arteries and veins become markedly engorged and tortuous, the veins four or five times their usual caliber. The peripheral gray zone of the retina has more visible vessels which spread out fan wise. Superficial retinal hemorrhages appear at this stage and a

well defined line develops which demarcates the gray area from the rest of the retina. The dilated vessels appear to run over the edge. This marks the beginning of the detachment of the retina, which progresses at a variable rate. It may subside at this stage or progress in the more severe cases to the formation of multiple retinal balloons and later to the development of a retrolental membrane. The author regards the retinal folds as postinflammatory retraction bands. The vitreous opacities appear at the stage of active vascular dilatation and are related to the advancing edge of the retinal separation or to individual retinal vessels. The cobweb-like strands can be seen coming forward into the clear vitreous taking their root from an engorged tortuous vein. Patches like scars of isolated patches of choroiditis often appear. Treatment with 20 to 25 mg. of ACTH daily in divided doses was carried out. In none of the four treated cases did the process go on to total detachment.

Beulah Cushman.

Kiewe, P. L., and Hart, F. D. **Cytoid bodies in the retina in a case of malignant disease.** *Tr. Ophth. Soc. U. Kingdom* 71: 309-318, 1951.

Friedenwald in 1948 said that the histologic appearance of cytoid bodies suggested that they are the result of a peculiar type of cellular degeneration and are evidence of local ischemic processes due to arteriolar closure at the level of the last bifurcation. The authors describe their own observations of the reaction of these tissues to many stains. Their results, compared with previous work, provide strong evidence that the cytoid bodies are not cellular but more probably exudates. Serum albumin and globulin contain carbohydrates as an essential part of the protein molecule.

The only common factors in the variety of conditions in which cytoid bodies have been observed appear to be toxemia or an-

oxemia, with capillary damage followed by increased permeability of the vessel wall from which exudation results. Therefore cytoid bodies are probably agglomerations of congealed albuminous exudates molded into their characteristic shape by the structure of the supporting tissue of the nerve-fiber layer formed by Müller fibers and their glial cross-beams. (5 figures, 16 references)

Beulah Cushman.

Lelong, M., Rossier, A., Fontaine, M., Lemasson, C., Michelin, J., and Audibert. **The retinopathies of prematures (retrolental fibroplasia).** *Arch. franç. pédiat.* 9: 897-914, 1952.

The authors have described the ophthalmoscopic picture in a previous paper. Their object now is to discuss the development of the disease and compare their findings with the different hypotheses which have been advanced. They found that in 566 premature infants under 2,000 gm. in weight there were 95 retinopathies; 32 were complete fibroplasias with blindness, 9 partial detachments, and 54 healed without sequellae. The disease is a clinical entity, the cicatricial, terminal stage of a progressive disease which affects extreme prematures whose weight is below 1,850 gm. and especially those under 1,500 gm. The beginning is insidious, the time of onset unpredictable. A vascular hyperactivity with abnormal capillary proliferation marks the onset. The authors recognize the six stages in the disease which have been described by American authors. During any one of them a remission may occur. In stage 1 and 2 spontaneous healing takes place in 56.9 percent of cases; in the next three stages there is still hope for partial regression (partial detachment in 9.5 percent) but in stage 6 blindness is certain. Etiology and pathogenesis are unknown but the authors express the belief that the principal factor is the immaturity itself,

the inability of the retina to become adapted to postnatal function. With this are associated anoxemia and other metabolic and nutritional difficulties. There is no treatment and the only prophylaxis is the prevention of prematurity itself. (17 tables)
B. T. Haessler.

Lepri, Guisepppe. **Treatment of vitreous hemorrhage with streptokinase and streptodornase.** *Rassegna ital. d'ottal.* 21:338-349, Sept.-Oct., 1952.

In one case, marked loss of vision followed a severe blow to the eye and a massive hemorrhage in the vitreous. In the second case a perforating wound from a piece of pipe also led to a dense blood clot in the vitreous chamber. The use of the extract of hemolytic streptococcus injected into the orbit led to a marked clearing. The use of this enzyme in the subconjunctival space, orbit, and anterior chamber of the rabbit is reported. It is well tolerated and produces no reaction. (19 references)
Eugene M. Blake.

Lijo Pavia, Justo. **Macular degenerative changes of a glassy appearance.** *Rev. oto-neuro-oftal.* 27:51-60, May-June, 1952.

Four cases are presented of macular degenerative changes of a glassy appearance, with absence of perimacular, macular and foveal reflexes, and atrophy of all layers of the retina, except the internal limiting membrane. The lesions consisted of irregular patches, the bases of which were occupied by remains of pigmented epithelium, cotton-like substances, numerous whitish strands, scattered lumps of pigmented cells and many disseminated glassy shining corpuscles, probably of cholesterolin. In one case vision was diminished to 20/400 in each eye. Visual fields were very much constricted, dark adaptation diminished, and there was slight dyschromatopsia. Physical examination showed hepatic insufficiency and arterial hypotension. There was increased cho-

lesterolemia. The author believes that the hypercholesterolemia might be the cause of this type of perimacular and macular degeneration. (2 figures, 29 references)
Pedro Vargas.

Lloyd, R. I. T. **Treatment of retinal detachment.** *Tr. Ophth. Soc. U. Kingdom* 71:649-650, 1951.

It is difficult to estimate the real value of scleral resection because it has been used mainly as a last resort for old and complete detachments and those in which diathermy has failed. The details of the operation can vary with the individual requirements. The author has found that the flat type of mattress suture with fairly thick silk is the best. He has also abandoned the use of the Lock Brille goggles during convalescence and results have shown no deterioration.

Beulah Cushman.

Nicolato, Angelo. **Lamellar resection of the sclera and its application.** *Rassegna ital. d'ottal.* 21:309-325, Sept.-Oct., 1952.

The author discusses the development of the scleral resection and the advantages and disadvantages of different methods. Of 26 cases reported three were successful and three unsuccessful where recurrences of detachment had followed the classical operation. In aphakic cases, six were successful and three not; in high myopia three operations succeeded and three failed, while in arteriosclerotic detachments there were three reattachments and one failure. The whole series represents satisfactory and lasting results in 60 percent of cases. Details of 16 cases are described. (5 references)

Eugene M. Blake.

O'Malley, C. C. **Vitreous withdrawal as a therapeutic procedure.** *Tr. Ophth. Soc. U. Kingdom* 71:773-778, 1951.

A section was made in the conjunctiva, sutures were inserted and the sclera was

punctured with a Graefe knife 7 or 8 mm. from the limbus in the lower outer quadrant. In four patients the vitreous cleared somewhat and the vision was improved after the withdrawal of $\frac{1}{2}$ cc. of vitreous with a 14 hypodermic needle attached to a syringe. Normal volume and tension returned in a week after operation.

Beulah Cushman.

Philips, A. Seymour. **Modern treatment of retinal detachment.** Tr. Ophth. Soc. U. Kingdom 71:631-647, 1951.

Recognizing the 21st anniversary of the diathermy operation, the author points out that we can now claim cures in 60 to 65 percent of all cases. He then discusses the 35 to 40 percent of failures which occur 1. in the long standing detachments, present for six months or more with secondary changes, 2. where no hole can be found, and in them indirect ophthalmoscopy may be of great help, 3. where there is massive vitreous retraction so that the retina either breaks away again or never returns at all to its bed, 4. with the degenerate retina and vitreous of high myopia, and 5. where the operation is followed by a violent reaction ending in vitreous disturbance and hemorrhage. Diathermy is to be used for all disinsertions and in cases in which a retinal hole is found and there has been some reposition with rest.

If no hole is found, or if a hole is found and no reposition of the retina takes place a scleral resection is indicated. Scleral resection is indicated in aphakic eyes with retraction of the vitreous and without degeneration of the vitreous or retina. The operation causes a choroidal inflammation over a wide peripheral area of retina where aphakic detachment usually starts. Diathermy may produce vitreous retraction, and therefore is usually of no help in aphakic detachments. (11 figures)

Beulah Cushman.

Reca, Arturo B. **Thrombosis of the central retinal vein.** Arch. y Mem. Soc. oftal. del Litoral 4:76-81, 1951.

Four cases of the condition are presented, in three of which a complete recovery took place under treatment with vasodilators. Current ideas on the pathology, the prognosis and the treatment of the disease are shortly reviewed.

A. Urrets-Zavalía, Jr.

Shapland, C. Dee. **Modern treatment of detachment of the retina.** Tr. Ophth. Soc. U. Kingdom 71:651-659, 1951.

In 110 eyes treated with diathermy procedures the author obtained reposition in 65.5 percent, improvement in 11.8 percent, and failure in 22.7 percent. In 1950, with other surgical procedures and notably lamellar sclerectomy, reposition was obtained in 72.9 percent of 48 eyes. He has modified Lindner's undermining operation and places one minim of 3-percent caustic potash solution in each trephine area by means of a tuberculin syringe and a lacrimal cannula. This is of special help when the retina is thin and atrophic and has large, multiple, and widely spaced rents. (2 figures, 4 tables)

Beulah Cushman.

Shapland, C. Dee. **Scleral resection—lamellar.** Tr. Ophth. Soc. U. Kingdom 71:29-48, 1951.

The author reviews the history of scleral resection from Leopold Müller in Vienna in 1903 at which time the outer orbital wall was removed according to Krönlein to reach the posterior part of the globe. The operation was used in the treatment of high myopia with separation of the retina. Removal of scleral staphyloma associated with separation of the retina has been reported. He reports the use of lamellar scleral resection in an area extensively diathermized where he left a thin film of scleral tissue, as it was firmly

adherent to the choroid. He obtained a satisfactory result.

The advantages of lamellar resection over the full thickness resection of the sclera are that there is little or no loss of vitreous, no bulging of the choroid and no need to reduce the ocular tension or tie any sutures until they have all been inserted and the resection completed. Like full-thickness scleral resection this operation is indicated in 1. detachment in aphakia, 2. detachments in high myopia with multiple peripheral defects and atrophy of the retina, 3. detachments which have been operated upon unsuccessfully by diathermy, especially in patients with one blind eye, 4. patients with large peripheral retinal dialyses exceeding a quadrant, 5. detachment with vitreous contraction or retraction following intra-ocular hemorrhage or perforating injuries, 6. detachments associated with staphyloma of the sclera, and 7. patients with high myopia with progressive loss of vision and field without retinal detachment. (6 figures, 5 tables, 26 references)

Beulah Cushman.

Silverman, W. A., Blodi, F. C., Locke, J. C., Day, R. L., and Reese, A. B. **Incidence of retrolental fibroplasia in a New York nursery.** *A.M.A. Arch. Ophthalm.* **48:** 698-711, Dec., 1952.

This is a report of a two-year study of the incidence of retrolental fibroplasia in Babies Hospital, New York. Infants were transferred to this nursery from other hospitals and are included in the series. There was no significant relationship between the incidence of retrolental fibroplasia and cutaneous hemangiomas or other congenital anomalies. No causal relationship was demonstrated between

cessation of oxygen administration and onset of retrolental fibroplasia. No significant relationship existed between gestational age at birth and time of clinical onset of the disease. The severity of the disease was unrelated to the degree of prematurity. An inverse relationship was found between birth weight and the age at which the first fundus changes appeared. Regression of fundus changes were noted after removal of infants from high oxygen concentrations. The incidence of the disease was greater in 1951 than in 1950 though no change was made in management of the infants. In every case the first fundus changes were seen before the expected day of birth at full term. (9 charts, 1 table) G. S. Tyner.

Tinelli, F. **Scintillation of the vitreous.** *Gior. ital. oftal.* **5:**157-169, March-April, 1952.

The chemical, physical, and biological factors concerned with the pathogenesis of scintillation of the vitreous are reviewed. Five cases are reported in detail before concluding that scintillation does not represent a well defined entity, but is rather a symptom of local and general changes which give rise to these phenomena of the vitreous body. In scintillation of cholesterol and other lipoids, with or without synchysis, the vitreous opacities vary from yellow gold to silvery white and are caused by increased permeability of the blood-vitreous barrier due to local changes. In scintillation of calcium salts, with or without synchysis, the opaque white bodies arise from a deficit of hyaluronic acid from various still unknown causes but related to a shift of the electrolytic balance toward the alkaline side. (32 references) J. J. Lo-Presti.

NEWS ITEMS

Edited by Donald J. Lyle, M.D.
601 Union Trust Building, Cincinnati 2

News items should reach the editor by the 12th of the month but, to receive adequate publicity, notices of postgraduate courses, meetings, and so forth should be received at least three months before the date of occurrence.

DEATHS

Thomas Andreas Gunnufsen, the last and most dextrous of Schiøtz's first assistants, died of cerebral hemorrhage at his home near Oslo, January 29, 1953, at the age of 74 years. He was a brilliant student, graduating at the head of his class from the University of Oslo in 1904. He devised a new trephine, proposed improvements in the Elliot operation, and his work on "Postoperative treatment of primary glaucoma" attracted much favorable attention.

ANNOUNCEMENTS

ORTHOPTIC EXAMINATIONS

The annual examination of orthoptic technicians by the American Orthoptic Council will be conducted in August and October, 1953.

The written examination will be nonassembled and will take place on Thursday, August 27, in certain assigned cities and offices and will be proctored by designated ophthalmologists.

The oral and practical examinations will be on Saturday, October 10th, in Chicago just preceding the meeting of the American Academy of Ophthalmology and Otolaryngology.

Application for examination will be received by the office of the secretary of the American Orthoptic Council, Dr. Frank D. Costenbader, 1605 22nd Street, N.W., Washington 8, D.C., and must be accompanied by the examination fee of \$30.00. Applications will not be accepted after July 1, 1953.

HOME STUDY COURSES

The Home Study Courses in the basic sciences related to ophthalmology and otolaryngology, offered as a part of the educational program of the American Academy of Ophthalmology and Otolaryngology, will begin on September 1, 1953, and continue for a period of 10 months. Registrations must be completed before August 15th.

Detailed information and application forms may be obtained from Dr. William L. Benedict, executive secretary-treasurer of the academy, 100 First Avenue Building, Rochester, Minnesota.

PLACEMENT SERVICE

The American Association of Orthoptic Technicians wishes to announce that a confidential placement service has been organized for positions for certified orthoptic technicians. Information regarding available technicians and positions open can be obtained by writing Mrs. Louisa Wells Kramer, 1779 Massachusetts Avenue, N.W., Washington 6, D.C.

MISCELLANEOUS

POST TESTIMONIAL PROGRAM

On the program arranged in honor of Dr. Lawrence T. Post by the staff of the Department of Ophthalmology, Washington University, Saint Louis, Missouri, were:

Dr. Moacyr E. Alvaro, São Paulo, Brazil; Dr. James H. Allen, New Orleans, "The use of peritoneum as a substitute for conjunctiva in plastic surgery: A preliminary report"; Dr. Walter S. Atkinson, Watertown, New York, "Akinesia of the orbicularis"; Dr. Alton E. Braley, Iowa City, Iowa, "Malignant exophthalmos: Etiology and treatment"; Dr. A. D. Ruedemann, Detroit, "Bilateral exophthalmos: Etiological factors and treatment"; Dr. Derrick Vail, Chicago, "Metastatic intraocular melanoma"; Dr. Paul Chandler, Boston, "Iridectomy for drawn-up pupil."

Dr. Donald J. Lyle Cincinnati, "Reading difficulty (paralexia) from impairment of visuo-oculogyric adjustment"; Dr. Frederick C. Cordes, San Francisco, "Subhyaloid hemorrhage following subarachnoid hemorrhage"; Dr. Jonas S. Friedenwald, Baltimore, "Diabetic retinopathy"; Dr. Everett L. Goar, Houston, "Observations on cataract surgery"; Dr. Daniel B. Kirby, New York, "A technique for total biopsy of neoplasms of the iris: Report of a case of removal of a leiomyoma"; Dr. Peter C. Kronfeld, Chicago, "The hypertensive response of the human eye to anterior-chamber puncture"; Dr. A. Ray Irvine, Beverly Hills, "Variations of the normal endothelium of the cornea"; Dr. William P. McGuire, Winchester, Virginia, "Present concepts of surgery of the superior oblique."

RESEARCH PROGRAM

At the fifth annual meeting of the midwestern section of the Association for Research in Ophthalmology, held at the Elliot Auditorium, Oscar Johnson Institute, Saint Louis, Missouri, the following papers were presented: "Experimental granulomatous uveitis: Studies on the mechanism of production of the contralateral reaction after the use of horse serum in rabbits," Dr. T. F. Schlaegel, Jr. and Dr. Fred Wilson, Indiana University, Indianapolis; "Residual accommodation under homatropine-cocaine cycloplegia," Dr. Paul M. Brickley, Mayo Clinic, Rochester, Minnesota; "Aqueous outflow measurements by continuous tonometry in rarer forms of glaucoma," Dr. B. J. Mansheim, State University of Iowa, Iowa City; "A classification of retrolental fibroplasia: With some additional observations of the

clinical course." Dr. Ivan E. Hix, Jr., University of Colorado, Denver; "Experimental use of polyethylene in the eye of the rabbit," Dr. Donald T. Hughson, Marquette University, Milwaukee; "Growth of lens epithelium in culture," Bernard Schwartz, Betty Danes and Dr. P. J. Leinfelder, State University of Iowa, Iowa City; "The effect of local cortisone on wound healing in rabbits," Dr. E. S. Palmerton, University of Minnesota, Minneapolis; "Bacteriological studies in newborn infants using terramycin, terramycin-polymyxin-B and silver nitrate," Dr. T. H. Willcockson and Dr. Charles B. Cox, University of South Dakota, Vermillion; "Mechanism of the mitotic-resistant pupil with increased intraocular pressure," Dr. George S. Tyner, University of Colorado, Denver; and "Some contributions to the clinical application of electroretinography," Dr. George W. Bounds, Jr., and Dr. Bruno Bagolini, State University of Iowa, Iowa City.

USAF COURSE IN OPHTHALMOLOGY

Air Force ophthalmologists assigned in the European theater have attended a unique postgraduate course in their specialty. Beginning January 18th, the last of five two-week sessions completed the program which took the ophthalmologists to London and made available some of the finest ophthalmic clinical and research facilities in England. The Air Force medical officers attended the course two at a time so that the hospitals would not be without the services of all the specialists at one time.

The program was originally suggested by Dr. Brittain F. Payne, New York, national consultant in ophthalmology to the Surgeon General, USAF. Preliminary planning was accomplished by Col. R. L. Braswell, USAF (MC), surgeon, Third Air Force; Mr. Keith Lyle, ophthalmological consultant to the Royal Air Force; and Miss Mary Push, ophthalmic surgeon, University of London Institute of Ophthalmology. Mr. Robert Davenport, administrator of the ophthalmic hospitals, University of London, and Sir Stewart Duke-Elder, ophthalmic surgeon to the queen, contributed to the planning at later stages.

Final arrangements and course schedules were handled by Mr. Davenport. The facilities which were opened for the course were Moorfields, Royal Westminster Ophthalmic Hospital and the Institute of Ophthalmology.

SOCIETIES

EGYPTIAN MEETING

The scientific meetings celebrating the 50th anniversary of the Ophthalmological Society of Egypt were held at 42, Kasr El Ainy Street, Cairo, from February 16 to 28, 1953.

WILLS PROGRAM

At the fifth annual clinical conference of the staff and ex-residents of the Wills Eye Hospital,

Philadelphia, the following program was presented:

Dr. Ivan J. Koenig, "Malignant melanoma of the iris in a one-eyed patient: Observed for 20 years"; Dr. Clyde H. Jacobs, "Cataract extractions under intravenous pentothal sodium anesthesia (a film)"; Virginia L. Weimer, Ph.D., Harry Green, Ph.D., and Dr. Irving H. Leopold, "Analysis of steroids in the anterior chamber"; Dr. J. Eisenberg, Dr. Irving H. Leopold, and Dr. J. W. Hallett, "Evaluation of radioactive material in diagnosis of intraocular tumors"; Dr. William H. Kratka and Dr. Irving H. Leopold, "Evaluation of isonicotinic-acid hydrazides in ocular tuberculosis"; Dr. J. O'Rourke and Dr. Irving H. Leopold, "Influence of streptokinase and streptodornase on intraocular hemorrhages"; Dr. Adolph W. Vogel and Dr. Irving H. Leopold, "Methods for production of experimental posterior segment lesions."

Dr. Warren S. Reese and Dr. Turgut Hamdi, "Experiences with the Ridley implant"; Dr. P. Robb McDonald, "Indications for scleral resection in retinal detachment"; Dr. Wilfred E. Fry, Dr. Max Kasser, and Dr. Samuel DeLong, "Histologic changes in experimental lamellar scleral resection (with film)"; Dr. Robert E. Shoemaker, "Ocular complications of erythema multiforme exudativum"; Dr. Raynold N. Berke, "Resection of levator palpebral muscle for blepharoptosis (film)"; Dr. Edmund B. Spaeth, "Principles for surgery of the vertically acting muscles in strabismus."

The Arthur J. Bedell Lecture was given by Dr. John H. Dunnington of New York. The subject of his address was "Suture materials in cataract extraction."

Through the courtesy of the Smith, Kline & French Laboratories, the following surgical procedures were shown by color television: Iridenceleisis, Elliot trephining operation, muscle surgery, cataract surgery, linear extraction, Kroenlein orbitotomy, corneal transplantation, Blaskovics operation, and retinal detachment surgery.

BETTER SIGHT FOR TOMORROW

At the 1953 conference of the National Society for the Prevention of Blindness, Inc., held recently in New York, the program was built around the theme, "Better sight for tomorrow." The conference was opened by Mr. Mason H. Bigelow, president of the society, who spoke on this subject.

Chairman of the first session of the conference was Dr. W. G. Smillie of Cornell University Medical College, New York, and the subject of the session was "Opportunities for improving and restoring sight." "In a State crippled-children's program," was discussed by Dr. Edward Davens, Baltimore; "In a State welfare program," by Miss Marguerite Blase, Topeka, Kansas; "Among the blind," By Peter J. Salmon, Brooklyn, New York.

Dr. Marian Crane, Washington, D.C., Dr. R. Gerald Rice, Boston, and Dr. Walter S. Schachar, New York, discussed "Vision testing in light of the St. Louis research."

Mrs. Dorothea DiPreto, New York, was chairman of the panel discussion on "The education of partially seeing children." Leading the panel were Mrs. Winifred Hathaway, New York; Mrs. Dorothy Bryan, Springfield, Illinois; Mrs. Della Loviner, Columbus, Ohio; and Dr. Helen M. Wallace, New York.

The panel on "New developments in industrial vision programs," was led by Mr. W. J. Niederauer, New York. Mr. Henry B. Carpenter, Syracuse, New York, spoke on "Dispensing protective eyewear."

Dr. John H. Dunnington, New York, as chairman of the panel on "Review of current scientific knowledge," introduced: Dr. R. Townley, Paton, New York, who spoke on "Corneal transplant"; Dr. Peter C. Kronfeld, Chicago, "Glaucoma"; Dr. Conrad Berens, New York, "Uveitis"; Leona Zacharias, Ph.D., Boston, "Retrolental fibroplasia"; and Dr. Hunter H. Romaine, New York, "Myopia."

On the panel discussing "Problems in preventing blindness," were: "Prevention of eye accidents from air guns and other weapons," Mrs. Helen Curtis Demary, Washington, D.C.; Dr. Benjamin Esterman, New York; Mrs. Marcella C. Goldberg, Pittsburgh, and General Merritt A. Edson, Washington, D.C.; "Professional relationships," Mrs. Dorothy Gray, Chicago, "Volunteer projects," Mrs. Robert W. Preston, Roslyn, New York, and Mr. Ernest R. Fryxell, New York.

IOWA SYMPOSIUM

Guest speakers at the "Symposium on retinal diseases," held recently at the State University of Iowa College of Medicine, Iowa City, were: Dr. Herman Elwyn, New York; Dr. Jonas S. Friedenwald, Baltimore; Dr. Dohrmann K. Pischel, San Francisco; Dr. C. L. Schepens, Boston; Dr. Henry P. Wagoner, Rochester, Minnesota; and Dr. George Wald, Cambridge, Massachusetts.

Members of the staff of the Department of Ophthalmology at Iowa State, which sponsored the symposium, are: Dr. Alson E. Braley, Dr. P. J. Leinfelder, Dr. Hermann M. Burian, Dr. George W. Bounds, Jr., Dr. Frederick C. Blodi, Dr. Arthur C. Wise, Miss Betty Danes, Ph.D., and Mr. Peter Rieser, Ph.D.

PITTSBURGH OFFICERS

Dr. Murray F. McCaslin, Carlton House, Pittsburgh, is president and Dr. C. William Weisser, 806 May Building, Pittsburgh, is secretary of the Pittsburgh Ophthalmological Society.

LOS ANGELES SOCIETY

Dr. Orwyn H. Ellis is president and Dr. Harold Owens, secretary-treasurer, of the Los Angeles

Society of Ophthalmology and Otolaryngology. Chairman and secretary of the Section on Ophthalmology are Dr. Robert A. Norene and Dr. Sol Rome; of the Section on Otolaryngology, Dr. Leonard R. House and Dr. Max E. Pohlman. The Ophthalmology section meets at 6:00 p.m. the first Thursday, the Otolaryngology section at 6:00 p.m. the fourth Monday of each month, September to June, at the Los Angeles County Medical Association Building, 1925 Wilshire Boulevard.

BUTTE MEETING

The Montana Academy of Oto-Ophthalmology held its midwinter session recently in Butte with Dr. Fritz D. Hurd, Great Falls, presiding.

GEORGIA SPEAKERS

At the annual meeting of the Georgia Society of Ophthalmology and Otolaryngology held recently at the General Oglethorpe Hotel, Savannah, Dr. Louis H. Clerf, Philadelphia, Dr. Edmund P. Fowler, Jr., New York, Dr. Theodore E. Walsh, Saint Louis, Dr. Peter C. Kronfeld, Chicago, Dr. Edmund B. Spaeth, Philadelphia, and Dr. Frank B. Walsh, Baltimore, were guest speakers.

PERSONALS

Dr. Patrick J. Kennedy, associate professor of ophthalmology, Graduate School of Medicine, University of Pennsylvania, has been appointed attending surgeon at the Wills Eye Hospital, to succeed Dr. William J. Harrison, who has served in that capacity since 1939 and who, on retirement, is serving as a consulting surgeon to the hospital. Dr. Kennedy has been a member of the Wills Eye Medical Staff since 1933. He has been chief in ophthalmology at the Fitzgerald-Mercy Hospital, Darby, since 1939 and from 1944 to 1951 held the same post at Misericordia Hospital.

The 16th annual deSchweinitz Lecture will be given on Thursday, November 19, 1953, by Dr. Alan C. Woods, of Baltimore, whose subject will be "The pathogenesis and treatment of ocular tuberculosis."

Dr. Harvey E. Thorpe, Pittsburgh, attended the recent Inter-American Congress of the American College of Surgeons at São Paulo, Brazil. He addressed the congress on "Treatment of uveitis," and also addressed the staff of the Eye Department at the University of São Paulo, on "Mattress sutures and scleral incision in cataract extraction." Dr. Thorpe also held conferences with the Brazilian Society of Ophthalmology and the Brazilian Society of Allergy on "Scleral incisions and sutures in cataract surgery," "Lamellar scleral resection for the repair of retinal detachment," and "Ocular allergy."

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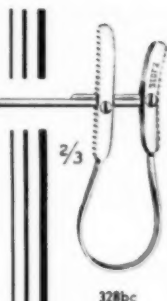
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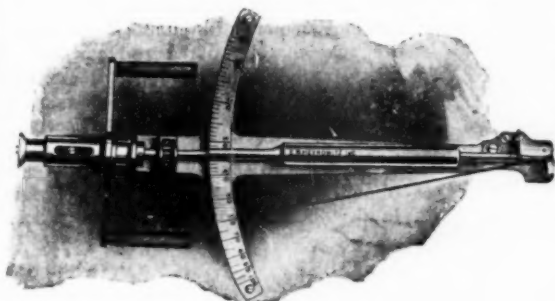
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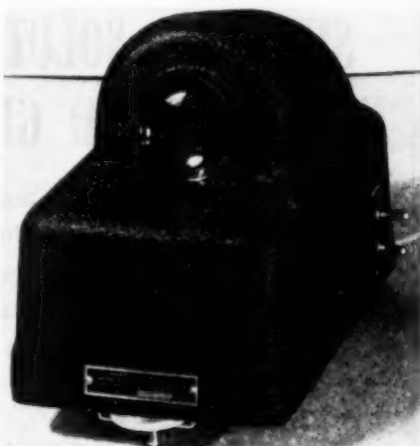
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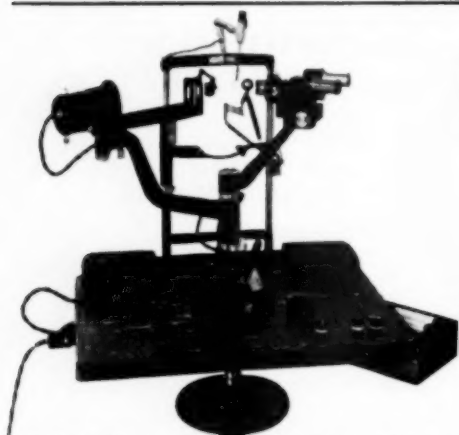


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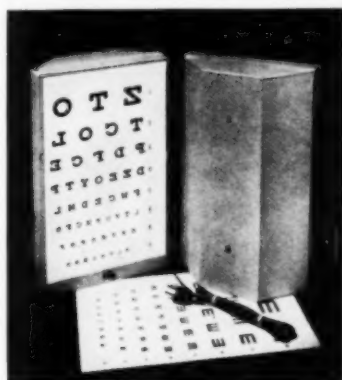
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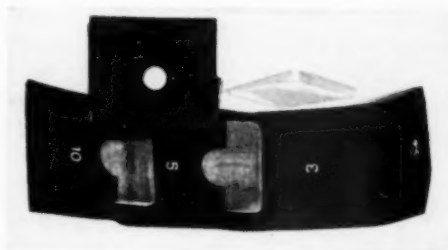


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